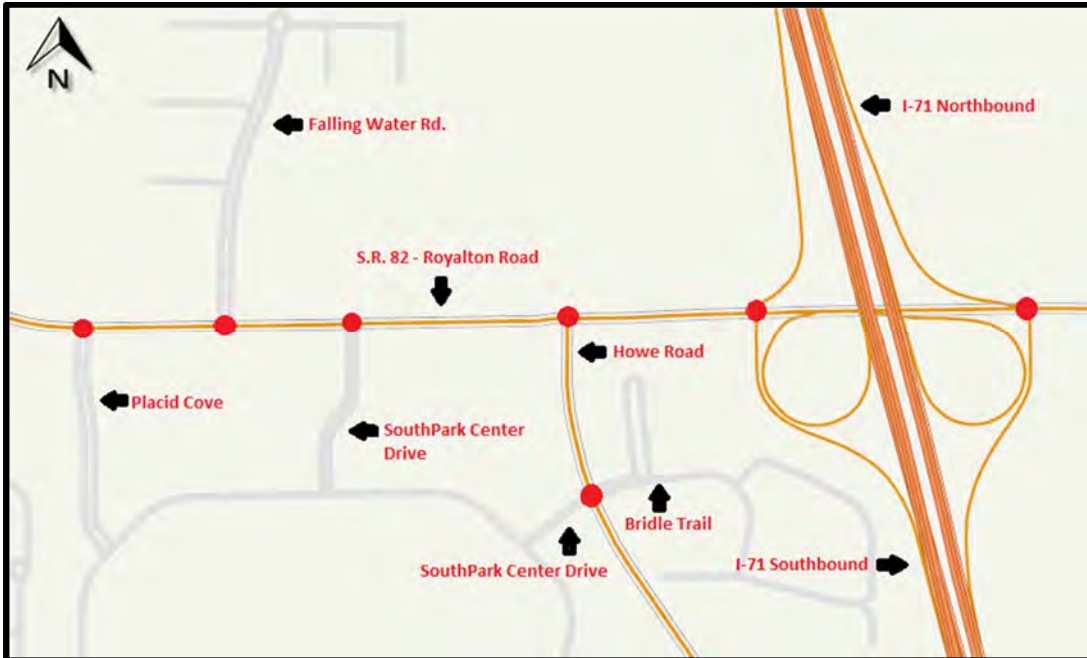


2012 Safety Study

Further Evaluation of Safety Improvements and  
Congestion Mitigation for the SR-82 Corridor near the  
I-71 Interchange  
City of Strongsville, Cuyahoga County, Ohio



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City of Strongsville, Cuyahoga County, Ohio

## Final Report

Submitted To:

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Appendix D – HCS Analysis

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Appendix F – ECAT Analysis with Existing Conditions

Appendix G – Lane Utilization Factor Calculations

Appendix H – Cost Analysis

Appendix I – Traditional Widening Analysis with Dual Left Turn Lanes at Howe Road WB

## **Information Sources**

Signal Progression Study, by TEC for ODOT D12, January 2013

Interchange Modification Study, by Hatch Mott MacDonald for City of Strongsville, July 2013

2013 ODOT Traffic Survey available online at:

<http://www.dot.state.oh.us/Divisions/Planning/TechServ/traffic/Pages/Traffic-Count-Reports-and-Maps.aspx>

ODOT Safety Analyst available online at:

<http://www.dot.state.oh.us/Divisions/Planning/SPPM/SystemsPlanning/Pages/SafetyPriorityLists.aspx>

Howe Road\Howe Road Extension Traffic Counts, by Hatch Mott MacDonald for ODOT D12, February 2014

## **1.0 Introduction**

This study, identified as CUY-82-2.93, provides an analysis of safety and countermeasures for State Route 82 (Royalton Road SR-82) from the intersection of the I-71 northbound ramps to the intersection of Placid Cove Drive. The study area encompasses six intersections on SR-82. According to the 2012 “Urban Non-Freeway” Safety Analyst list, SR-82 from log point 3.26 to 3.36 ranks 19<sup>th</sup> in the state for crash frequency, and from log point 3.17 to 3.26 ranks 484<sup>th</sup>. The intersection of SR-82 and Howe Road ranked 35<sup>th</sup> in the state on the 2012 “Urban Intersection” Safety Analyst list. The purpose of this study is to analyze the traffic conditions due to congestion-related crash trends and determine if any improvements to the local road network (FHWA 8-point Interstate Access Policy, Point #1) would improve traffic congestion and reduce crashes.

## **2.0 Existing Conditions**

Within the study area, SR-82 is classified as an urban principal arterial with a speed limit of 35 mph. The 2013 Traffic Survey indicates an Average Daily Traffic (ADT) of 31,810 with 4.0 percent trucks at the intersection of Howe Road and 28,470 with 4.0 percent trucks at the I-71 interchange. The ADT for I-71 north of the State Route 82 interchange was 90,050 with 4.5 percent trucks, and for I-71 south of the SR-82 interchange the ADT for I-71 is 58,720 with 6.5 percent trucks.

From east to west on SR-82, the first two intersections are the northbound and southbound entrance and exit ramps for I-71. The first intersection is a three-legged signalized intersection with SR-82 and the I-71 northbound ramps. The second intersection is a four-legged signalized intersection with SR-82 and the I-71 southbound ramps. The third intersection is with SR-82 and Howe Road. SR-82 and Howe Road is a four-legged signalized intersection with dual left turn or left-through lanes on each approach. South of SR-82, Howe Road leads to an intersection with SouthPark Center Drive/Bridle Trail. North of SR-82 is the entrance to a commercial development hereafter referred to as Howe Road Extension. The next intersection along SR-82 is SouthPark Center Drive, the main entrance to the mall located on the south side of SR-82. The following intersection is SR-82 and Falling Water Road, a three-legged intersection with one left turn lane in the eastbound direction. The last intersection in this study is the intersection of SR-82 and Placid Cove Drive. It is a four-legged signalized intersection with a left turn lane in each direction and right turn lanes in the southbound and eastbound directions. Figure 1 shows the study area.

Existing condition diagrams were prepared and are included as Appendix A.

Figure 1 – Study Area



## 2.1 Data Sources

Several existing data sources were utilized for this report, however, the traffic volumes utilized consist primarily of those from the Signal Progression Study prepared by TEC for ODOT District 12 in January 2013. Additional traffic data provided for the analysis included ODOT certified traffic and supplemental traffic data from Traffic Survey Flow Maps made by the ODOT Office of Technical Services. Other traffic counts utilized were the Howe Road/Howe Road Extension Traffic Counts performed by Hatch Mott MacDonald for ODOT in February 2014. These counts, requested for this study, supplemented the Signal Progression Study data in areas that were outside the limits of the Signal Progression Study. The Highway Safety Improvement Program Priority Locations list was used to determine the three high priority locations within the study area. The Interchange Modification Study from July 2013 is also referenced in this report.

## 2.2 Analysis Methodology

A comparison of the changes in congestion (Level of Service, or LOS) at each intersection for each of the countermeasures carried forward was performed. Tables of this LOS comparison were prepared at each of the intersections in both Synchro and HCS analysis (Tables 1 and 2). These tables note the changes to LOS, whether improvement or degradation. These two traffic analysis programs use different methodologies, and in general, the Synchro analysis shows greater LOS improvement with the proposed countermeasures than does the HCS analysis. Countermeasures were also evaluated based upon figures prepared in this report. Table 3 shows the

Economic Crash Analysis Tool (ECAT) analysis, and predicts which intersections have the greatest potential for safety improvements (SR-82 with the NB Ramps, SouthPark Drive, and Placid Cove Drive).

### 2.3 Traffic Volumes

Figure 2 and Figure 3 show the traffic volumes for the SR-82 intersections of Howe Road and the I-71 Southbound ramps in the AM and PM peaks, respectively. The AM peak has a heavy right turn from Howe Road northbound onto SR-82 eastbound. That movement combined with the heavy through traffic along SR-82 eastbound causes congestion in the curb lane with vehicles trying to access the I-71 southbound and I-71 northbound entrance ramps. In the PM peak both the left turn movement from SR-82 westbound to Howe Road southbound and the westbound through movement are extremely heavy, which are the primary cause of congestion.

Figure 2 - AM Traffic Volumes

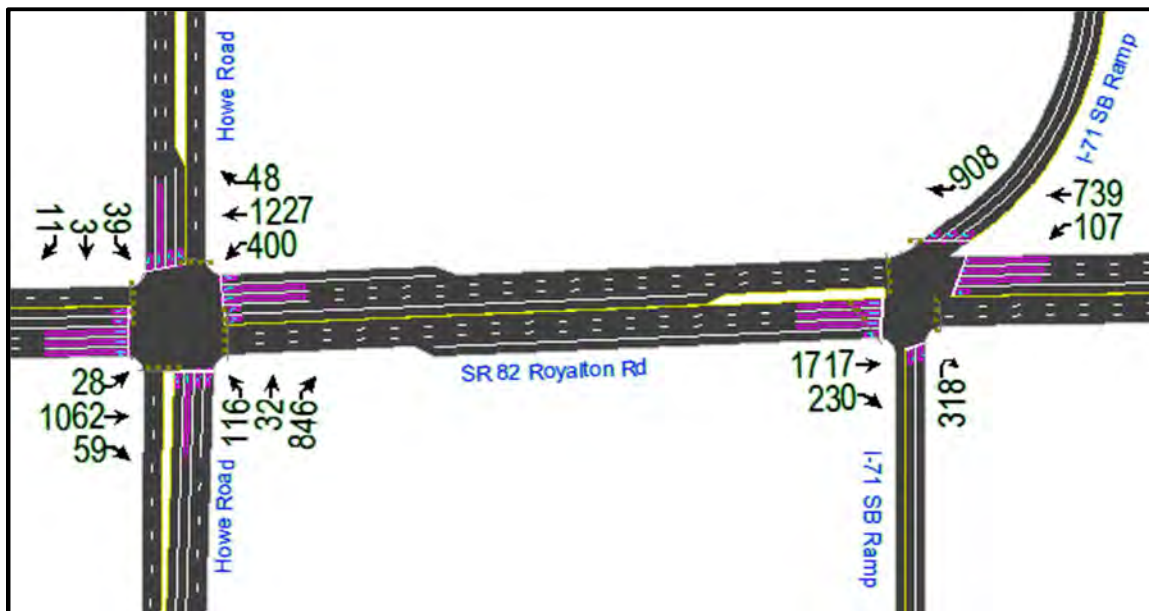
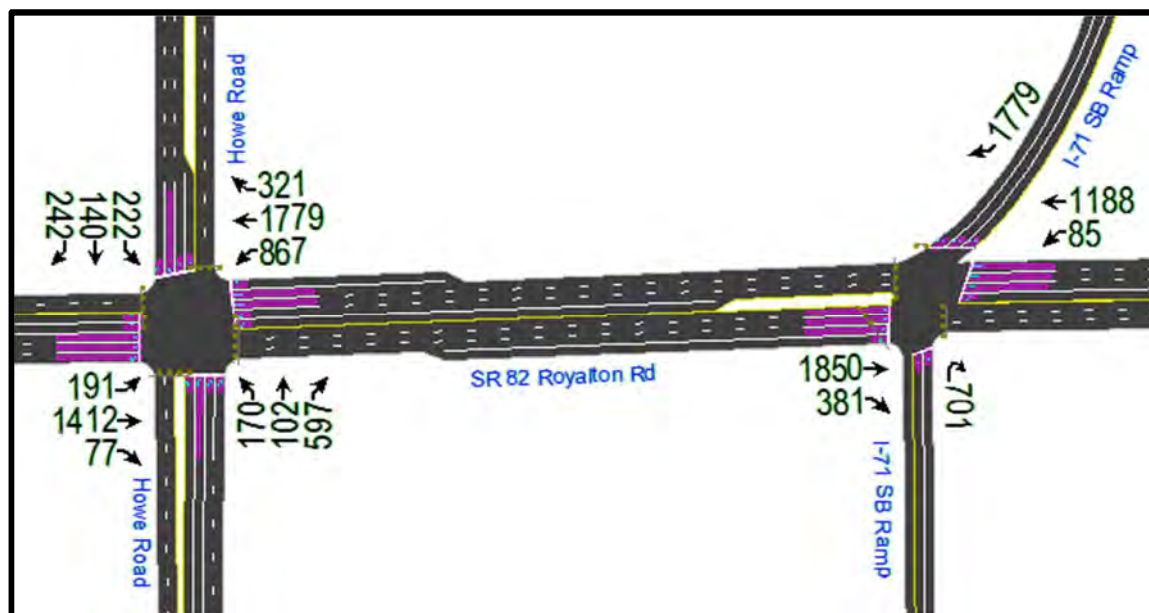




Figure 3 - PM Traffic Volumes



#### 2.4 Origin-Destination Study

An Origin-Destination Study was performed to determine the respective destinations for eastbound traffic volumes on SR-82 for traffic that originates at the SR-82 intersection with Howe Road. The destinations studied for eastbound SR-82 were the I-71 southbound ramp, the I-71 northbound loop ramp, and continuing eastbound on SR-82 through the intersection with the northbound ramps. The Origin-Destination vendor obtained 6 hours of data (3 hour AM peak and 3 hour PM peak) on Thursday, November 21, 2013. The data was then matched from the origin entry points with the data at the destination points to provide the Origin-Destination Report. The Origin-Destination vendor used their experience in providing origin-destination studies to determine the location of the data collection and the method of adjustment to the raw data. Adjustments made are due to the technology's limitations of only being able to match 50%-70% of the license plates collected. Unaccounted license plates were categorized in the raw data as traveling to Station E. The assumption was adjusted with consideration to the 50%-70% match range and therefore the raw data categorized to Station E was reduced by 40% ( $1 - [(50\% + 70\%) / 2] = 40\%$ ). The full Origin Destination Study is included as Appendix B.

The right (curb) lane along eastbound SR-82 develops queues with vehicles attempting to turn on Howe Road, the I-71 southbound ramp, and the I-71 northbound ramp. The Origin-Destination Study was used to help determine the lane utilization, and ultimately the lane utilization factor for the capacity analyses, for the through lanes on eastbound SR-82.

#### 2.5 Existing Capacity Analysis

The models and traffic volumes from the recently completed Signal Progression Study, which utilized Synchro software, served as the foundation for the analyses in this project,

with a summary of the results shown in Table 1. The Synchro analysis was used to determine the optimum signal phasing, timing, and progression offsets in order to minimize system delay for the six signalized intersections within the study limits. Lane utilization factors were modified in Synchro to reflect the field conditions for the oversaturated eastbound curb lane. The lane utilization factors used are included in Appendix G. The level of service shown in the table is the Synchro level of service for the intersection. The v/c ratio shown in the table is for the worst movement of the intersection. The Synchro Analysis is included as Appendix C.

**Table 1 – Existing Synchro Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	B	0.78 NBL	B	0.83 NBL
2	I-71 SB ramps	D	1.05 EBT	F	1.24 EBT
3	Howe Road	E	1.28 NBR	F	1.40 EBT
4	SouthPark Center Drive	A	0.61 SBL	C	0.79 SBL
5	Falling Water Road	A	0.55 WBTR	A	0.71 WBTR
6	Placid Cove Drive	A	0.56 WBTR	C	0.80 WBTR

Due to the potential need for an Interchange Modification Study (IMS), a capacity analysis using the methodology required by ODOT for an IMS, was also performed using the Highway Capacity Software 2010 to evaluate existing volumes and existing conditions for the AM and PM peak periods. The methodology used with the HCS analysis balances delay for the worst approach on one roadway with the worst approach on the other roadway, and the same lane utilization factors used for the Synchro analysis were used to reflect field conditions for the oversaturated eastbound curb lane. Table 2 summarizes the HCS results for intersection level of service and the worst movement v/c ratio. The HCS Analysis is included as Appendix D.

**Table 2 – Existing HCS Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	C	1.06 EBT	D	1.13 EBT
2	I-71 SB ramps	D	1.06 EBT	E	1.03 EBT
3	Howe Road	E	1.16 WBT	E	1.12 WBT
4	SouthPark Center Drive	C	1.06 WBTR	D	1.07 WBTR
5	Falling Water Road	B	1.00 WBTR	C	1.07 WBTR
6	Placid Cove Drive	D	1.05 WBTR	D	0.99 WBTR

## 2.6 Crash Analysis

Crash data was reviewed from the 2010 formal safety study that was completed on July 31, 2012. The crashes analyzed in this study were from 2008-2010. 70 percent of the crashes were rear end crashes and the majority of the crashes occurred during the weekday PM peak hours (4:00-7:00pm), on Saturdays, and during November and

December. Currently, the ODOT Highway Safety Program lists 3 “safety priority” locations with their rankings within the study area. They are:

- State Route 82 is ranked #19 from SLM 3.26 to 3.36
- State Route 82 is ranked #484 from SLM 3.17 to 3.26
- The intersection of State Route 82 and Howe Road ranked #35 in the State.

The portion of the project on Howe Road Extension is not currently a public street, therefore no crash data is available on Howe Road Extension.

### **2.7 Economic Crash Analysis Tool (ECAT) Analysis – Existing Conditions**

The Economic Crash Analysis Tool (ECAT) was used to calculate predicted crash frequencies and severities to establish a baseline for the predicted crashes at the 6 signalized intersections. Table 3 shows a summary of the predicted crashes for each intersection in a given year, the expected crashes for a similar intersection based on national crash averages, and a potential for safety improvements to the intersection. Three of the intersections have the “Potential for Safety Improvements” column highlighted in red, as a result of the predicted crashes for those intersections being less than the expected crashes for a similar intersection. Those three intersections are outperforming their peers from a safety perspective. The existing ECAT analysis is included in Appendix F.

**Table 3 – Existing ECAT Analysis**

<b>#</b>	<b>SR 82 Intersection with:</b>	<b>Predicted Crashes</b>	<b>Expected Crashes</b>	<b>Potential for Safety Improvement</b>
1	I-71 NB ramps	19.8885	15.5676	-4.3209
2	I-71 SB ramps	33.5227	40.3806	6.8579
3	Howe Road	18.8860	33.5386	14.6526
4	SouthPark Center Drive	17.2463	16.3599	-0.8864
5	Falling Water Road	11.4893	11.9205	0.4312
6	Placid Cove Drive	18.4147	12.9124	-5.5023

### **3.0 Countermeasure Discussion**

Because of commercial development, the area around the I-71/State Route 82 interchange has had growing levels of traffic and congestion, leading to a number of capacity improvements and periodic safety studies. The countermeasure concepts for the CUY-82-2.93 safety study came from two primary sources: ODOT Central Office comments on an Interchange Modification Study developed by the City of Strongsville (Appendix F); and analysis and stakeholder meetings conducted as part of the CUY-82-2.93 safety study.

#### **3.1 Northbound left and thru accommodated via a U-turn at I-71 southbound**

The first countermeasure reviewed was to eliminate the northbound left and northbound thru movements at the SR-82 and Howe Road intersection by only permitting a right turn onto eastbound SR-82, and then subsequently providing for these movements via a U-turn at the intersection of SR-82 and the I-71 southbound ramps. This would eliminate the northbound signal phase, allowing more time for the other phases.

**Analysis:** Synchro analysis shows that the AM and PM No-Build conditions are over capacity for the EBT at the I-71 southbound exit ramp. Adding a U-turn phase at the I-71 southbound ramp would produce three overcapacity movements at the Howe Road intersection and the I-71 southbound ramp intersection. This same scenario would produce seven overcapacity movements between the two intersections. This alternative is not recommended for further study.

#### **3.2 Northbound left and thru accommodated via a U-turn at I-71 northbound**

Another countermeasure was to eliminate the northbound left and northbound thru movements at the SR-82 and Howe Road intersection by only permitting a right turn onto eastbound SR-82, and then subsequently providing for these movements via a U-turn at the I-71 northbound entrance/exit ramps. This solution appears to improve delays at three intersections along SR-82 (Howe, I-71 SB, and I-71 NB).

**Analysis:** Drivers attempting to make a NBL or NBT movement on Howe Road would have to drive approximately 4,000 feet (2,000 down and 2,000 back) more than their desired path to make this movement; AASHTO guidance shows the ideal location for a U-turn is 500-660 feet from the main intersection. Due to the excessive driving distance of this proposed solution, a significant number of drivers would likely cut through the mall to get to their desired destination.

Utilizing the Mall roadways as the preferred route to accommodate Howe Road northbound left and northbound thru movements would eliminate those movements from the Howe Road and SR-82 intersection. Some Howe Road northbound left movements may already be utilizing this route and, as noted above, it could be a preferable route to motorists if median U-turns are to be utilized. No analysis was performed on this mall alternative, but this countermeasure could merit further consideration should the City of Strongsville and the Mall be willing to consider this option as the signed route.

### **3.3 Adaptive Signal Control**

Another countermeasure identified for consideration was adaptive signal control for three intersections along SR-82: I-71 Southbound, Howe Road and SouthPark Center Drive. Adaptive signal control generally provides the most benefit in a system that has a current volume to capacity (v/c) ratios around 0.7 to 0.9. SR-82 currently has v/c >1.0 which is beyond the ideal range. When volumes approach capacity, there is no time for the adaptive signal to alter the phases and the adaptive signal system defaults to a fixed time operation. Therefore the adaptive signal control countermeasure was expected to produce diminishing returns by itself and is not presently recommended as a stand-alone alternative. Adaptive signal control of this corridor is worth consideration for further study as part of a city-wide project.

### **3.4 Realign Howe Road; Run Dual Left Turn Lanes Simultaneously**

Another countermeasure was realigning Howe Road so that the dual left turn lanes on each approach could be offset to allow them to run simultaneously. The simultaneous operation of the left turn lanes provides a relatively minimal operational benefit at a substantial cost of widening the Howe Road and SR-82 intersection; therefore this countermeasure was not carried forward.

### **3.5 Two Lane Entrance Ramp from SR-82 Eastbound to I-71 Northbound**

A countermeasure to alleviate the excessive queues in the eastbound curb lane was to change the existing lane assignments for the three lanes on SR-82 Eastbound at the I-71 northbound ramp entrance from Thru|Thru|Right to Thru|Thru-Right|Right and add a second entrance lane to the existing loop ramp. The lane utilization factors were revised to represent the spreading of traffic bound for I-71 northbound to two lanes instead of one due to the addition of the second entrance lane to the loop ramp. The lane utilization factor calculations used in the analysis are included as Appendix G. In order to maintain the existing SR-82 bridge over I-71, the two lane loop ramp would need to merge from two lanes to one lane prior to the tangent section of the entrance ramp to avoid having a bridge pier impact. See Exhibit A for a graphic representation of this countermeasure.

The current excessive queues on SR-82 eastbound would improve with the addition of the second lane on the ramp; however, it is undetermined to what extent. The existing bridge piers for the SR-82 bridge over the Interstate limits the length of the additional lane on the loop ramp, which would force drivers on the ramp to merge into one lane before they reach the Interstate. While the addition of a second lane to the entrance of the loop ramp would improve current traffic conditions at Howe Road based on the analysis for SR-82, the second lane of the loop ramp must merge before reaching the Interstate, resulting in a single lane entrance ramp to merge with I-71 northbound.

A Synchro capacity analysis was performed to evaluate the benefits of improving the lane utilization along SR-82 eastbound using the existing volumes for the AM and PM peak periods. The revised lane utilization factors for the addition of the dual entrance to the loop ramp were used in this analysis. Table 4 summarizes the Synchro results for the

intersection level of service and the worst movement v/c ratio. The Synchro Analysis is included as Appendix C.

**Table 4 – Improved Lane Utilization Synchro Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	B	0.78 NBL	B	0.83 NBL
2	I-71 SB ramps	C	0.83 SBR/EBT	C*	0.94 SBR
3	Howe Road	D*	0.81 NBR	E*	1.08 EBT
4	SouthPark Center Drive	A	0.71 SBL	C	0.92 SBL
5	Falling Water Road	A	0.55 WBTR	A	0.71 WBTR
6	Placid Cove Drive	A	0.56 WBTR	C	0.81 WBTR

\* LOS improved from No Build conditions

The assumed revised lane utilization factors improve the v/c ratios along SR-82. This would allow an increase of 250 additional vehicles to reach the loop ramp during the AM peak hour and an increase of 180 additional vehicles to reach the loop ramp during the PM peak hour.

A capacity analysis was also performed using Highway Capacity Software 2010 to evaluate the benefits of improving the lane utilization along SR-82 eastbound using the existing volumes for the AM and PM peak periods. In accordance with ODOT methodology, the HCS analysis was used to balance delay for the worst approach on one roadway with the worst approach on the other roadway. The revised lane utilization factors for the addition of the second entrance to the loop ramp were used in this analysis. Table 5 summarizes the HCS results for intersection level of service and the worst movement v/c ratio. The HCS Analysis is included as Appendix D.

**Table 5 – Improved Lane Utilization HCS Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	C	1.06 EBT	D	1.13 EBT
2	I-71 SB ramps	D	0.95 WBL	E	1.08 SBR
3	Howe Road	E	1.16 WBT	E	1.12 WBT
4	SouthPark Center Drive	D <sup>†</sup>	1.06 WBTR	D	1.07 WBTR
5	Falling Water Road	B	1.00 WBTR	C	1.07 WBTR
6	Placid Cove Drive	D	1.05 WBTR	D	0.99 WBTR

<sup>†</sup>LOS degraded from No Build conditions

The construction cost estimate of this countermeasure is \$1,300,000. The cost estimate is included as Appendix H.

Since the countermeasure includes adding a lane to an Interstate entrance ramp, this modification will require an IMS to ensure that there would not be a negative impact to the interstate system. The IMS would have to show that the proposed improvement works over a 20 year period, however, the HCS analysis comparison of tables 2 and 5 shows

that the two-lane entrance loop ramp countermeasure provides no improvement to the Level of Service from the current condition (ODOT guidance for IMS analyses require balancing the delay for the worst approach on one roadway with the worst approach on the other roadway at an intersection). The Synchro analysis does show an improvement to the Level of Service from the current condition—the results of the analyses vary due to the methodology required by ODOT to be used for a HCS analysis. Since the two methodologies produce conflicting results, approval of the two lane entrance ramp hinges on ODOT and FHWA acceptance of Synchro analysis for an IMS, which is a deviation from current IMS guidance which requires HCS analysis.

### **3.6 Traditional Widening of SR-82 and Howe Road**

The two lane entrance ramp from SR-82 eastbound to I-71 northbound does not bring the SR-82 intersections under capacity using the existing traffic volumes, so the Howe Road intersection with SR-82 still would require additional capacity. The traditional solution is to increase the number of lanes at the existing intersection where additional capacity is needed. For this analysis, the two lane entrance ramp from SR-82 eastbound to I-71 northbound is assumed to be implemented.

An additional SR-82 westbound lane was added from the I-71 southbound exit ramp through Placid Cove Drive to increase capacity for through movements. Additionally, an 800 foot long Thru-Right lane was added on the eastbound approach of SR-82. A third westbound left turn lane was also added on SR-82, which will subsequently require a third through lane on southbound Howe Road. The existing eastbound right turn lane to the I-71 southbound entrance ramp was lengthened by approximately 180 feet to receive the through movement from the Thru-Right lane added at Howe Road. See Exhibit B for a graphic representation of this countermeasure.

A Synchro capacity analysis was performed to evaluate the benefits of improving the lane utilization along SR-82 eastbound and the traditional widening at Howe Road using the existing volumes for the AM and PM peak periods. The revised lane utilization factors for the addition of the second entrance to the loop ramp were used in the analysis. Table 6 summarizes the Synchro results for the intersection level of service and the worst movement v/c ratio. The Synchro Analysis is included as Appendix C.

**Table 6 – Improved Lane Utilization with Traditional Widening Synchro Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	B	0.78 NBL	B	0.83 NBL
2	I-71 SB ramps	C*	0.83 SBR/EBT	C*	0.94 SBR
3	Howe Road	C*	0.89 NBR	D*	0.88 WBL
4	SouthPark Center Drive	A	0.52 SBL	C	0.69 WBL
5	Falling Water Road	A	0.40 SBL	A	0.61 SBL
6	Placid Cove Drive	A	0.39 WBTR	C	0.79 WBT

\*LOS improved from No Build conditions

A capacity analysis was also performed using Highway Capacity Software 2010 to evaluate the benefits of adding the additional lanes at the Howe road intersection with the two lane entrance to the loop ramp as calculated in the Synchro analysis above using the existing volumes for the AM and PM peak periods. The HCS analysis was used to balance delay for the worst approach on one roadway with the worst approach on the other roadway. The revised lane utilization factors for the addition of the second entrance to the loop ramp were used in the analysis. Table 7 summarizes the HCS results for intersection level of service and the worst movement v/c ratio. The HCS Analysis is included as Appendix D.

The HCS analysis shows that if Howe Road is improved as stated above without any further improvements to the interchange, the westbound left movement at the SR-82 and I-71 SB ramps intersection will become 37% over capacity. Before the Howe Road improvement, this movement was under capacity.

**Table 7 – Improved Lane Utilization with Traditional Widening HCS Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	C	1.06 EBT	E <sup>†</sup>	1.14 EBT
2	I-71 SB ramps	D	1.37 WBL	E	1.08 WBL
3	Howe Road	D*	1.03 WBT	E	1.12 WBL
4	SouthPark Center Drive	D <sup>†</sup>	1.05 WBR	D	1.07 WBTR
5	Falling Water Road	C <sup>†</sup>	1.03 WBR	C	1.07 WBTR
6	Placid Cove Drive	D	1.06 WBR	D	0.99 WBTR

\*LOS improved from No Build conditions

†LOS degraded from No Build conditions

As a result of adding the required lanes, SR-82 at the Howe Road intersection would be required to be widened by 36 feet (three lanes), and Howe Road southbound would be widened by 12 feet (one lane). If the widening would occur, it would have an impact on the businesses that front SR-82 and Howe Road southbound.

The construction cost estimate of this countermeasure is \$12,000,000. The cost estimate in Appendix H includes right of way costs but not utility relocation costs.

A comparison of tables 2 and 7 show that improvements to the SR-82 and Howe Road intersection provides minimal changes to the Level of Service in the current condition and substantially increases the v/c ratio at the southbound ramps intersection, in effect shifting the Howe Road intersection overcapacity condition one intersection east.

Three left turn lanes are not normally seen, but due to the amount of traffic attempting to make a left turn on to Howe Road the dual left turn lanes did not provide adequate capacity.



An additional capacity analysis of this alternative with dual left turn lanes instead of triple left turn lanes at Howe Road is included in Appendix I and is described in detail below in section 3.7.

### **3.7 Modified Traditional Widening of SR-82 and Howe Road**

The three additional lanes required at the SR-82 and Howe Road intersection in the traditional widening alternative in 3.2 impact several properties and increase the right of way costs. However, as stated above, the two lane entrance ramp from SR-82 eastbound to I-71 northbound does not bring the SR-82 intersections under capacity using the existing traffic volumes. The Howe Road intersection still requires additional capacity. Therefore, this modified traditional widening alternative adds only one lane to provide additional capacity. For this analysis, the two lane entrance ramp from SR-82 eastbound to I-71 northbound is assumed to be implemented.

An additional SR-82 westbound lane was added from the I-71 southbound exit ramp through Placid Cove Drive to increase capacity for the westbound through movement. See Exhibit D for a graphic representation of this countermeasure.

A Synchro capacity analysis was performed to evaluate the benefits of improving the lane utilization along SR-82 eastbound and the modified traditional widening at Howe Road using the existing volumes for the AM and PM peak periods. The revised lane utilization factors for the addition of the second entrance to the loop ramp were used in the analysis. Table 8 summarizes the Synchro results for the intersection level of service and the worst movement v/c ratio. The Synchro Analysis is included as Appendix C.

**Table 8 - Improved Lane Utilization with Modified Traditional Widening Synchro Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	B	0.78 NBL	B	0.83 NBL
2	I-71 SB ramps	F	1.47 EBT	E	1.19 EBT
3	Howe Road	F	1.36 NBR	F	1.40 EBT
4	SouthPark Center Drive	A	0.52 SBL	C	0.79 SBL
5	Falling Water Road	A	0.40 SBL	A	0.61 SBL
6	Placid Cove Drive	A	0.39 WBTR	C	0.65 SBT

A capacity analysis was also performed using Highway Capacity Software 2010 to evaluate the benefits of adding the additional lane at the Howe Road intersection with the two lane entrance to the loop ramp as calculated in the Synchro analysis above using the existing volumes for the AM and PM peak periods. The HCS analysis was used to balance delay for the worst approach on one roadway with the worst approach on the other roadway. Table 9 summarizes the HCS results for intersection level of service and the worst movement v/c ratio. The HCS Analysis is included as Appendix D.

Table 9 - Improved Lane Utilization with Modified Traditional Widening HCS Analysis

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	C	1.06 EBT	E <sup>†</sup>	1.14 EBT
2	I-71 SB ramps	D	1.37 WBL	E	1.52 WBL
3	Howe Road	D*	0.94 WBT	D*	1.14 WBL
4	SouthPark Center Drive	D <sup>†</sup>	1.06 WBR	D	0.99 WBTR
5	Falling Water Road	C <sup>†</sup>	1.02 WBR	C	1.05 WBTR
6	Placid Cove Drive	D	1.06 WBR	D	1.06 WBTR

\*LOS improved from No Build conditions

<sup>†</sup>LOS degraded from No Build conditions

As a result of adding another westbound through lane, SR-82 at the Howe Road intersection would be required to be widened by 12 feet. The Modified Traditional Widening is 24 feet less widening on SR-82 than the Traditional Widening alternative with no additional widening on Howe Road southbound.

The construction cost estimate of this countermeasure is: \$8,000,000. The cost estimate in Appendix H includes right of way costs but not utility relocation costs.

A comparison of tables 2 and 9 show that the one additional lane improvement to the SR-82 and Howe Road intersection improves the Level of Service at the Howe Road Intersection from E to D during both the AM and PM peaks. However, the level of service at adjacent intersections remains the same in most cases or degrades in other cases. The v/c ratio at the southbound ramps intersection substantially increases, in effect shifting the Howe Road intersection overcapacity condition one intersection east. Therefore it is not clear whether the traffic analysis associated with an IMS would support making this improvement as a medium-term countermeasure.

### 3.8 Median U-Turn at SR-82 and Howe Road Intersection

An alternative approach to increasing capacity at the existing SR-82 and Howe Road intersection is to consider innovative intersection designs. A median U-turn was analyzed with the U-turns occurring along Howe Road via roundabout intersections north and south of SR-82. For this analysis, the two lane entrance ramp from SR-82 eastbound to I-71 northbound is still assumed.

A median U-turn intersection involves the elimination of direct left turns from major and/or minor approaches (usually both). In this instance, drivers turning left from SR-82 onto Howe Road must first turn right at Howe Road, execute a U-turn at the downstream roundabout intersection, and proceed back through the main intersection. Drivers on Howe Road desiring to turn left onto SR-82 must first travel through the main intersection, execute a U-turn at the downstream roundabout intersection, and then turn right at SR-82 to complete the movement. Figure 4 shows a typical median U-turn.

Figure 4 – Typical Median U-Turn



In order to analyze the U-turn movements, additional data was needed. ODOT District 12 collected and supplied the additional traffic data along Howe at Bridal Trail south of SR-82 and at the three intersections north of SR-82. This data was used to expand the Synchro models to analyze the median U-turn alternative.

The following lanes had to be added to the existing intersection:

- An additional exclusive westbound right turn lane;
- An additional southbound right/through lane;
- Convert existing northbound Thru-Left lane into an exclusive northbound right turn lane; and
- Convert existing northbound left turn lane into a northbound thru lane.

In addition to above improvements at the SR-82 intersection with Howe Road, roundabouts were proposed both north and south of the intersection to permit the U-turns. The roundabout to the south was located at the intersection of Howe Road with the SouthPark Center Drive and Bridle Trail. The roundabout would be a two-lane roundabout with dual lanes entering the roundabout on all approaches except Bridle Trail, which would have a one-lane approach. There would be a dedicated southbound right-turn to SouthPark Center Drive.

The roundabout to the north on Howe Road Extension would be approximately 750 feet to the north of the SR-82 intersection with Howe Road. The roundabout would provide for a two lane approach northbound and southbound, but single lanes on the remaining approaches. See Exhibit C for a graphic representation of this countermeasure.

If the installation of the roundabouts would occur, it would have substantial impact on the businesses to the north of SR-82 on Howe Road Extension. This road is currently an access roadway on private property to a big-box retail shopping center. The

improvement as envisioned would not directly impact any individual retailer, however, a considerable property acquisition of the access roadway and parking area would be required to enable this countermeasure.

A Synchro capacity analysis was performed to evaluate the benefits of improving the lane utilization along SR-82 eastbound and constructing a median U-turn intersection at Howe Road using the existing volumes for the AM and PM peak periods. The revised lane utilization factors for the addition of the second entrance to the loop ramp were used in the analysis. Table 10 summarizes the Synchro results for the intersection level of service and the worst movement v/c ratio. The Synchro Analysis is included as Appendix C.

**Table 10 – Improved Lane Utilization & Median U-Turn at Howe Road Synchro Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	B	0.76 NBL	B	0.82 NBL
2	I-71 SB ramps	C*	0.87 EBT	C*	0.94 SBR
3	Howe Road	C*	0.85 NBR	D*	0.99 WBR/SBT
4	SouthPark Center Drive	A	0.59 WBTR	C	0.85 SBL
5	Falling Water Road	A	0.58 WBTR	A	0.73 WBTR
6	Placid Cove Drive	A	0.60 WBTR	C	0.84 WBTR

\*LOS improved from No Build conditions

A capacity analysis was also performed using Highway Capacity Software 2010 to evaluate the benefits of improving the lane utilization along SR-82 eastbound and constructing a median U-turn intersection at Howe Road using the existing volumes for the AM and PM peak periods. The HCS analysis was used to balance delay for the worst approach on one roadway with the worst approach on the other roadway. The revised lane utilization factors for the addition of the second entrance to the loop ramp were used in the analysis. Table 11 summarizes the HCS results for intersection level of service and the worst movement v/c ratio. The HCS Analysis is included as Appendix D.

The HCS analysis shows that if Howe Road is improved without the interchange being improved, the westbound left movement at the SR-82 and I-71 SB ramps intersection will become 38% over capacity. Before the Howe Road improvement, this movement was under capacity.

**Table 11 – Improved Lane Utilization & Median U-Turn at Howe Road HCS Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	C	1.06 EBT	D	1.12 EBT
2	I-71 SB ramps	D	1.38 WBL	E	1.08 SBR
3	Howe Road	D*	1.08 WBT	F <sup>†</sup>	1.25 WBT
4	SouthPark Center Drive	D <sup>†</sup>	1.11 WBTR	D	1.10 WBTR
5	Falling Water Road	C <sup>†</sup>	1.03 WBTR	C	1.08 WBTR
6	Placid Cove Drive	D	1.08 WBTR	D	1.08 WBTR

\*LOS improved from No Build conditions

<sup>†</sup>LOS degraded from No Build conditions

The roundabout intersections were analyzed using the HCM 2010 module within Synchro. Table 12 summarizes the HCM results for intersection level of service and the worst movement v/c ratio.

**Table 12 – Roundabout HCM Analysis**

#	Howe Road Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	SouthPark Center Drive/Bridle Trail	B	0.77 NBTR	E	0.91 NBTR
2	Approximately 750' north of SR-82	A	0.31 NBU	D	0.91 NBU

The construction cost estimate of this countermeasure is \$7,400,000. The cost estimate in Appendix H includes right of way costs but not utility relocation costs.

A comparison of tables 2 and 11 show that improvements to the SR-82 and Howe Road intersection do not necessarily improve the Level of Service in the current condition and substantially increases the v/c ratio at the southbound ramps intersection, in effect shifting the Howe Road intersection overcapacity condition one intersection east. Therefore it is not clear whether the traffic analysis associated with an IMS would support making this improvement as a medium-term countermeasure.

### 3.9 Potential Geometric Reconfiguration of Existing SR-82 Interchange

In order to reduce congestion in this area, the Howe Road intersection and the I-71 interchange on SR-82 must both be under capacity for all movements. While the alternatives above centered on traffic congestion for the Howe Road intersection, the I-71 interchange is close to failing on both the southbound to westbound exit ramp and the eastbound to northbound entrance ramp when capacity analyses were performed using 2013 traffic volumes. Finding a reasonable and practical fix for the I-71 interchange, but not the Howe Road intersection, or finding a fix for the Howe Road intersection, but not the I-71 interchange, will not provide lasting results for the SR-82 corridor in this area.

The I-71 interchange, which was originally designed to provide several free-flow movements, no longer functions as designed, and it is on the verge of being overcapacity for the southbound to westbound movement, and the eastbound to northbound

movement. If this was an isolated interchange where the adjacent intersections on SR-82 had no operational effect on the interchange and right-of-way was reasonably available in either the northeast and/or northwest quadrants, there would be several interchange configurations that could be recommend for study. They would include the diverging diamond interchange (DDI); the paraflow interchange; the parclo "A" interchange; the parclo "B" interchange with a distributor roadway; and the parclo "B" interchange with a distributor roadway operated as a DDI.

However, revamping the interchange without finding a solution for the Howe Road intersection will not provide substantive value. Howe Road would need to be widened in addition to the geometric improvements of the interchange which adds to the high cost of this improvement.

### **3.10 Potential Addition of a New Access Point**

A new access point to the freeway south of the SR-82 interchange could provide relief at the existing interchange and Howe Road by shifting a portion of the traffic to the new interchange to access SR-82 and the surrounding businesses from the south. A new interchange has the potential to be more cost effective with better traffic operations than the combination of a geometric reconfiguration of the existing interchange and widening of SR-82 at Howe Road.

#### **3.10.1 City of Strongsville IMS**

The City of Strongsville, ODOT, PB, and NOACA discussed these findings of the City's IMS in a planning meeting for the SR-82 corridor at ODOT D12 on August 12, 2014. ODOT D12 has presented these finding to the City for incorporation to a revised IMS, should that occur. A review of the highway capacity calculations for the intersection of SR-82 and Howe Road in the IMS indicates differences in analyses due to geometric assumptions made that permitted certain movements to operate concurrently in the same signal phase. If these differences are corrected, the Level of Service would be "F" and the v/c ratio would exceed 1.0 in the design year, which would prevent approval by ODOT and FHWA. In the IMS there is one eastbound left turn lane on SR 82 at Howe Road that ran protected/permitted. At that location there is currently a dual left turn lane that is protected only. The signal phasing change affects the number of cars that can make the left turn in a cycle. Other discrepancies are that the existing clearance intervals are longer than the intervals used in the IMS and that the HCS analysis from the IMS did not consider preferential lane use.

In addition, there is a recommendation to construct a single, isolated exit ramp (partial interchange) from I-71 southbound, which would form a four-legged intersection opposite the existing "T" intersection with Howe Road and Shurmer Road. However, FHWA requires all interchanges to provide for all traffic movements. A concept worth further consideration is the completion of the interchange by providing southbound I-71 access from Shurmer Road. While closer to compliance, this pair of ramps would still be considered a partial interchange and would not be compliant with FHWA policy on interchange designs.

A concept in compliance with the policy would be to reconstruct the I-71 SB exit to serve three destinations: SR-82 WB, SR-82 EB, and Shurmer Road. A collector-distributor roadway between SR-82 and Shurmer Road would be added to prevent ramp movements from degrading the I-71 SB mainline travel lanes. The addition of the collector-distributor roadway instead of the separate exit ramp for Shurmer Road would meet FHWA policy.

### **3.10.2 Additional Interchange**

Instead of adding a single, isolated ramp opposite Shurmer Road, consider adding an additional diamond interchange south of the SR-82 interchange (not necessarily at Shurmer Road). The added diamond interchange would not only reduce left turns arriving from southbound I-71 to southbound Howe Road, but would also reduce left turns from northbound I-71 to southbound Howe Road, as well as right turns from northbound Howe Road to eastbound SR-82.

As a result, if enough traffic from the critical movements could be diverted to the new diamond interchange, simple solutions may exist for revamping the Howe Road intersection without the addition of several lanes, which would be detrimental to some of the commercial businesses along both SR-82 and Howe Road, and add substantial cost to the project. Also, the reduction in traffic from the addition of an interchange, quite possibly will reduce the traffic volumes of the SR-82 interchange to the point where it will function again without lane additions. The addition of an interchange with full movements will meet FHWA requirements.

As noted above, if an additional interchange is added, it may be wise to locate it a minimum of 1 mile south of the SR-82 interchange – the minimum distance required by both State and Federal requirements. Shurmer Road is approximately 4,200 feet from the SR-82 Bridge. Since this is below the minimum interchange spacing of 1 mile, FHWA may require a collector-distributor system between the SR-82 interchange and the added interchange, to make it a single interchange with one exit and one entrance to and from I-71 in each direction. The addition of a collector distributor system for a new interchange, which would also require modifications to the SR-82 interchange, would be costly.

## **4.0 Summary of Countermeasure Analysis**

Currently, heavy traffic congestion exists on SR-82 within the confined area of the I-71 interchange and the adjacent Howe Road intersection, which is only 725 feet west of the I-71 interchange. Recognizing the traffic congestion and seeking remedial solutions, the City of Strongsville and ODOT have had two recent studies performed in this area: a traffic study designed to provide optimal signal timing for the traffic signals along SR-82 in this area using current traffic counts (2013); and an IMS with recommendations for a 2035 design year. A review of the signal optimization study showed that the current signal operation is maximizing the existing capacity of the corridor, but will not contribute substantially to the relief of future traffic congestion.

In reviewing the City's IMS, ODOT wanted to ensure that any and all low cost countermeasures had been identified and evaluated, before launching into a larger cost effort to reconfigure the interchange. During this study, a countermeasures discussion meeting was held with participants from ODOT D12, ODOT Office of Roadway Engineering, NOACA, the City of Strongsville, and Parsons Brinckerhoff. During the meeting, three countermeasures were identified as countermeasures to be carried forward for further analysis, and a fourth modified version of one of these countermeasures was also developed. These four countermeasures are those described in sections 3.5, 3.6, 3.7, and 3.8 and they include figures, capacity analysis, and cost estimates. The countermeasures selected are not options that can be evaluated with the ECAT tool. A qualitative comparison of the selected countermeasures was proposed as an alternate to ECAT, however, this method of evaluation was not requested.

This study confirms that all low cost alternatives have been identified and evaluated. Most of these alternatives were not feasible with 2013 traffic volumes and will not be feasible with future traffic growth. The alternative of a two lane loop ramp from SR-82 eastbound to I-71 northbound is a short-term countermeasure intended to provide relief for SR-82 eastbound by improving the lane utilization. The extent of the benefit is unclear due to the lanes being required to merge together on the ramp before reaching the freeway. The alternatives in 3.6, 3.7, and 3.8 are all medium-term countermeasures. Additionally, countermeasures 3.6, 3.7 and 3.8 include the short-term two lane entrance loop ramp from SR-82 eastbound to I-71 northbound. The addition of the second lane on the loop ramp will require an IMS.

It is unclear how long the four alternatives in 3.5, 3.6, 3.7, and 3.8 will provide benefit. At some point a long-term solution will have to be implemented, whether it is a reconstruction of the existing interchange at SR-82 and I-71 or a new interchange south of the existing one.



## **5.0 Conclusion and Recommendations**

Safety and congestion problems were reviewed and all low cost, short term countermeasures will not provide benefits commensurate to their costs. With these traditional low cost, short term countermeasures not recommended, the most viable long-term solution to this interchange is via a reconstruction/reconfiguration effort.

A review of the City of Strongsville IMS was completed; the IMS proposes a medium cost slip ramp to Shurmer Road, which is designed to relieve traffic congestion at the SR-82 and Howe Road intersection. However a review of the IMS calculations shows that SR-82 and Howe Road intersection remains overcapacity, so the Shurmer Road slip ramp recommendation does not provide a complete solution to all congestion problems at the interchange.

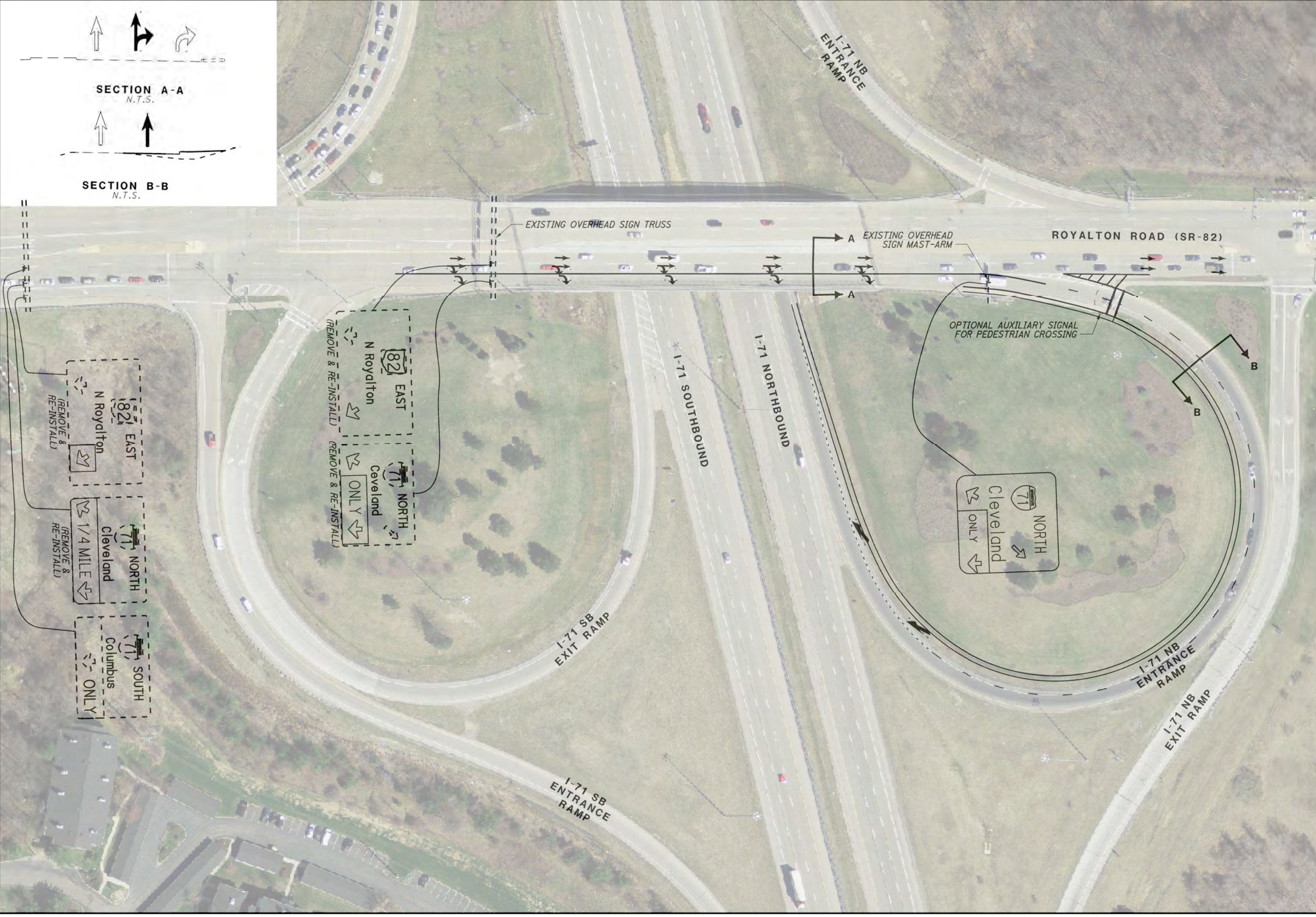
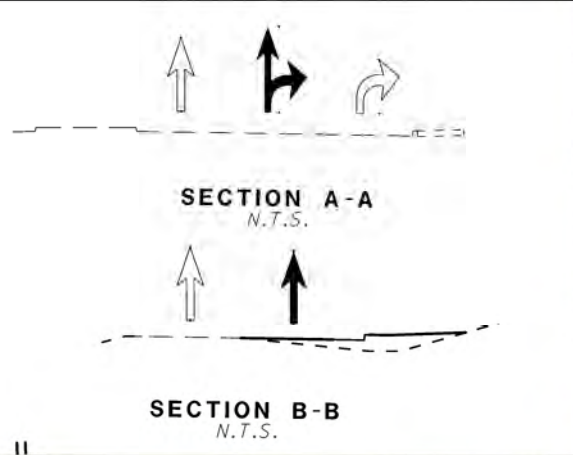
It is recommended that the addition of a second entrance lane to the I-71 northbound loop ramp and a reconstruction/reconfiguration of the SR-82 interchange be further studied through the ODOT IJS/IMS process as they may potentially provide an effective medium-term countermeasure. Some notes on this process are:

- ODOT noted that the peak hour traffic flow on Saturdays may exceed the peak hour traffic flow for the weekdays. The volumes from the 2013 Traffic Study that were provided by ODOT contain higher weekday PM peak than Saturday peak. The design for all alternatives should be based on the highest traffic volumes. We recommend collecting additional data to verify when the peak hour traffic occurs.
- Any time an additional lane is added within the limited access right-of-way of the Interstate System, an IMS is required. An IMS must use the ODOT methodology and design year traffic whereas the information contained in this Safety Study is based on current traffic (2013), not design year traffic (2035); has added lanes recommended that would require an IMS if pursued; and uses a methodology which is designed to optimize traffic flow with respect to delay, versus the ODOT methodology which is designed to balance delay between competing roadways.
- An ultimate design should be considered that would either replace the existing SR-82 interchange with I-71 in place, add an additional interchange to the south, or both.

## **Exhibit A**

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**Two Lane Entrance from SR 82 Eastbound to I-71  
Northbound Entrance Ramp**

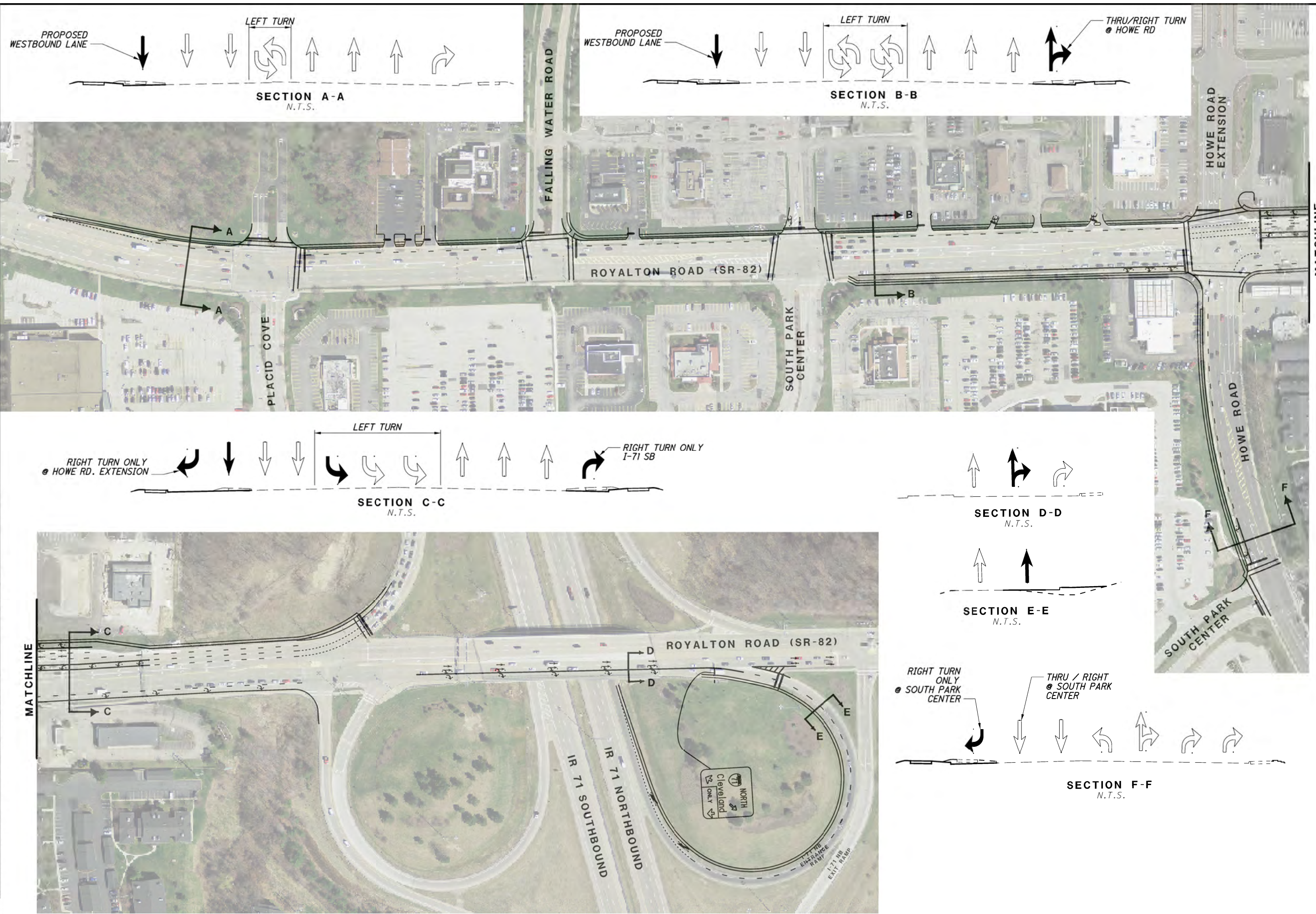


**EXHIBIT A-TWO LANE ENTRANCE FROM SR 82**  
**E.B. TO I-71 N.B. ENTRANCE RAMP**

## **Exhibit B**

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### **Traditional Widening at SR 82 and Howe Road Intersection**



**EXHIBIT B - TRADITIONAL WIDENING AT SR-82 AND HOWE ROAD INTERSECTION**

**CUY-82-2.93**

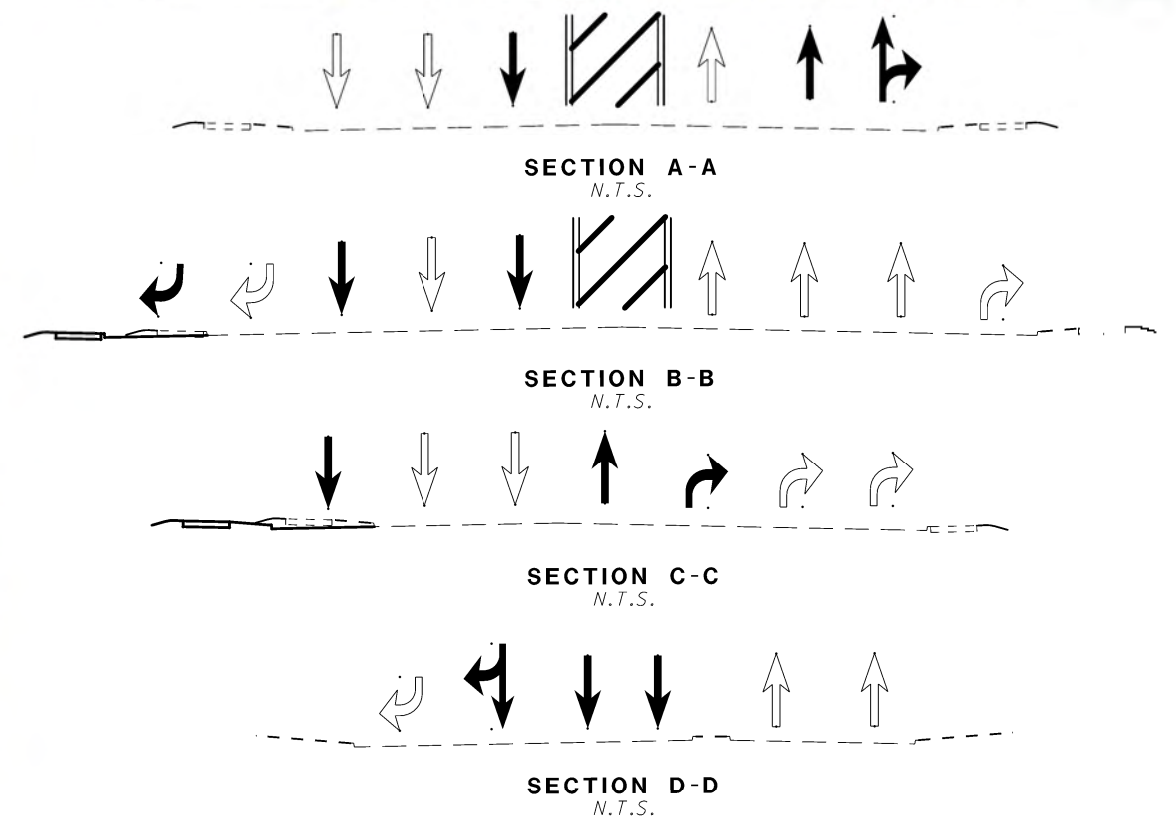
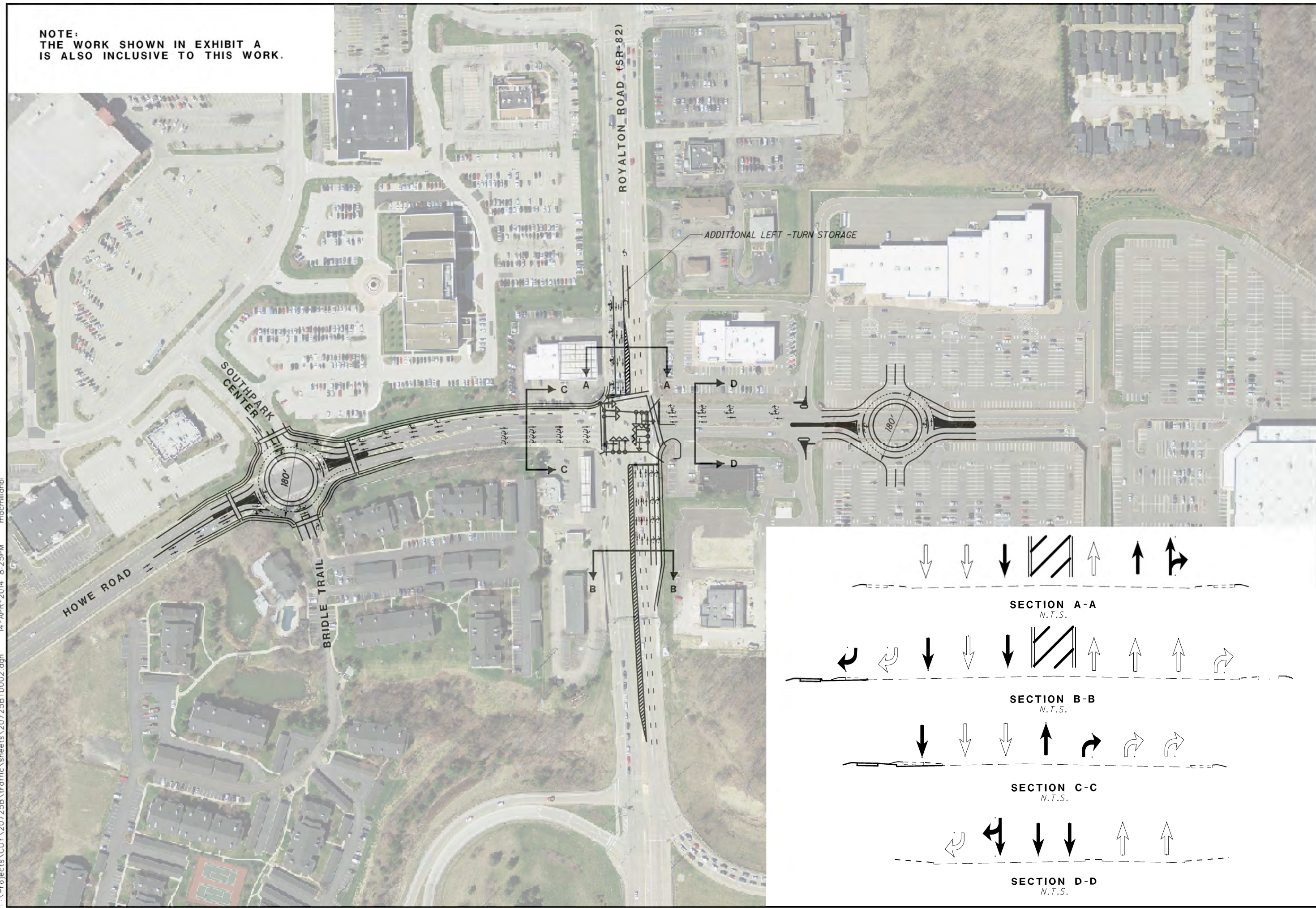
## **Exhibit C**

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### **Median U-Turn at SR 82 and Howe Road Intersection**

NOTE:  
THE WORK SHOWN IN EXHIBIT A  
IS ALSO INCLUSIVE TO THIS WORK.

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EXHIBIT C - MEDIAN U-TURN ( ROUNDABOUT )  
AT SR 82 AND HOWE ROAD INTERSECTION

CUY - 82 - 2.93



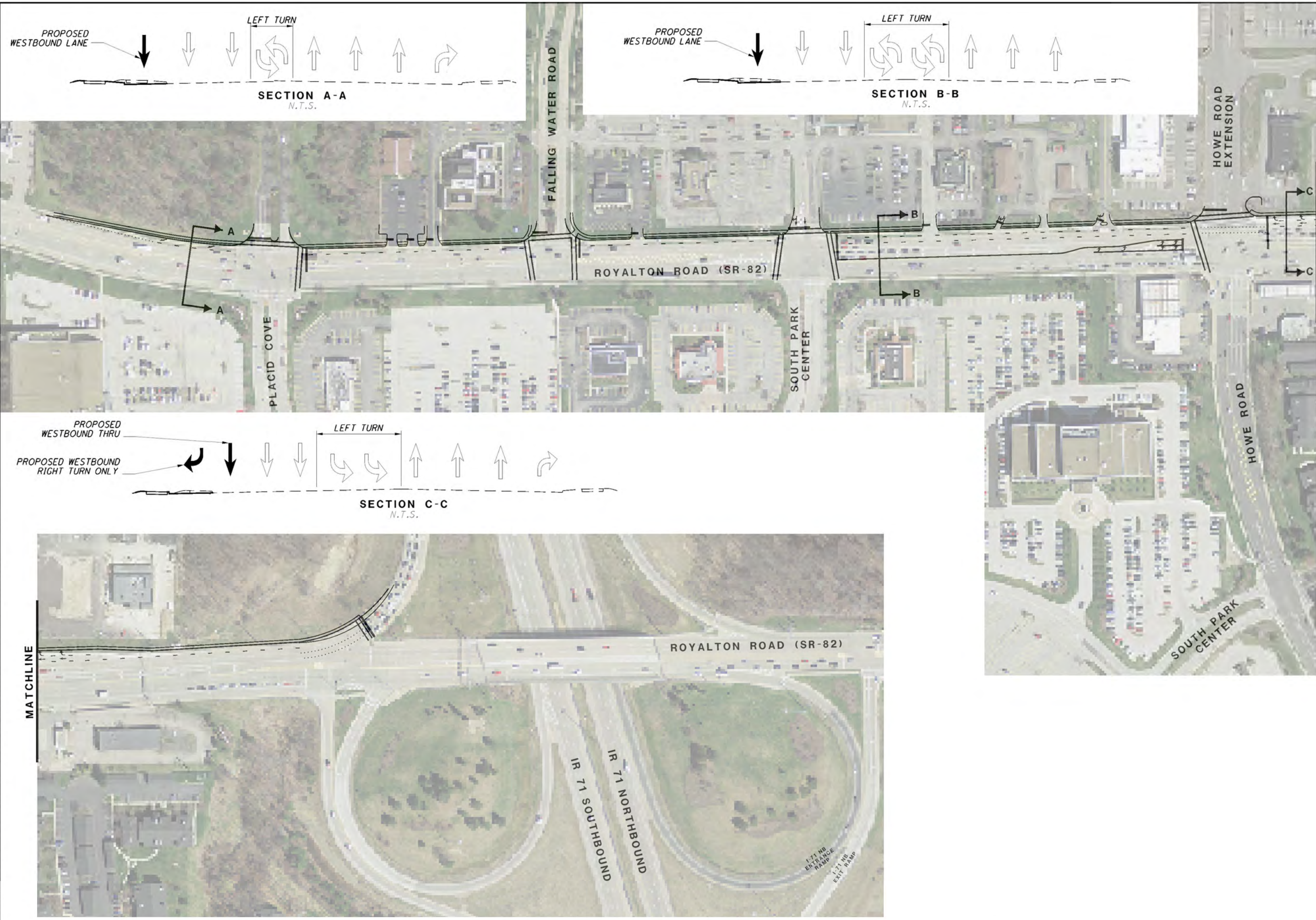
## **Exhibit D**

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### **Modified Widening at SR-82 and Howe Road Intersection**



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**EXHIBIT D - MODIFIED WIDENING AT  
 SR-82 AND HOWE ROAD INTERSECTION**

**CUY -82-2.93**

## **Appendix A**

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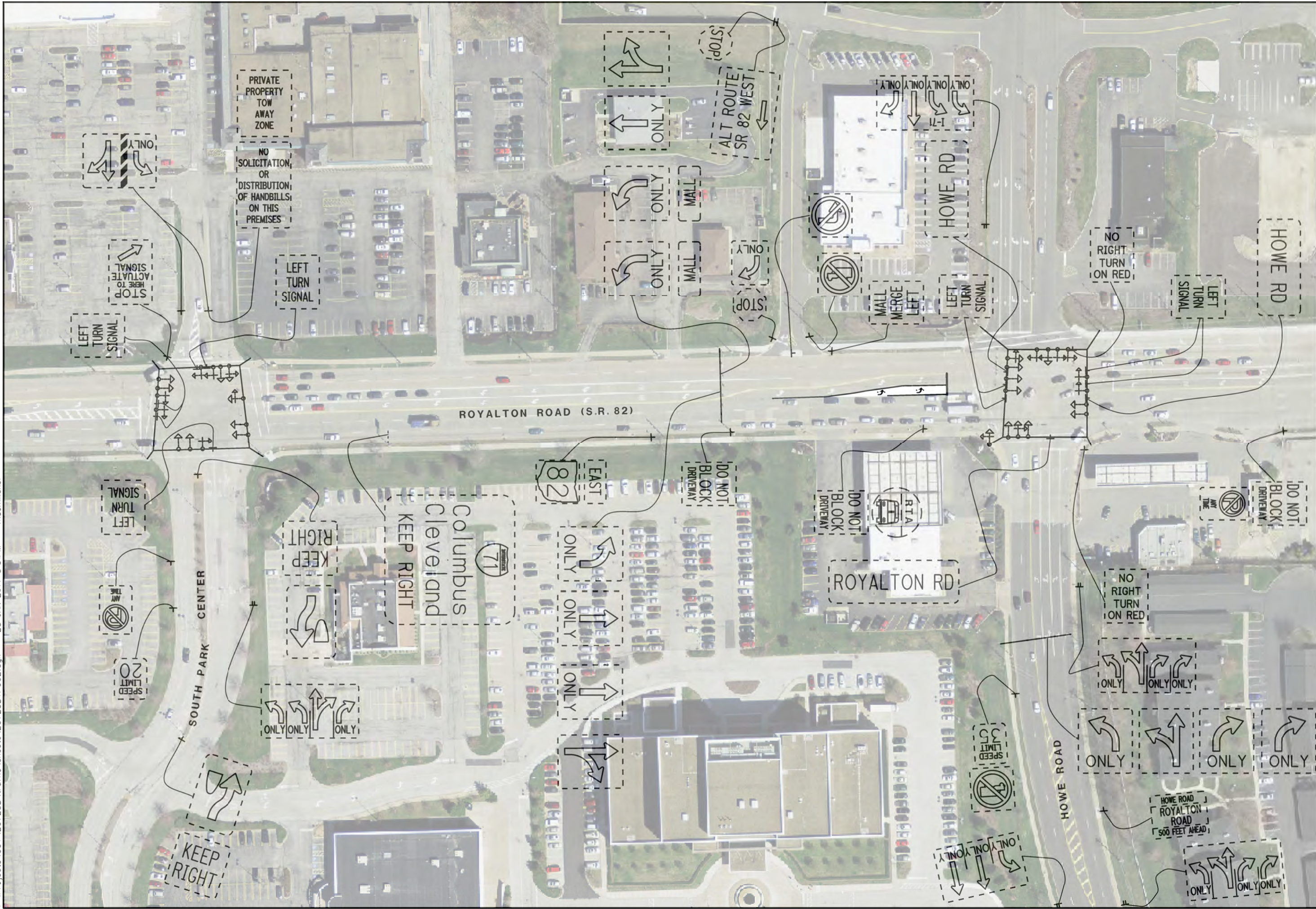
### **Existing Conditions Diagram**



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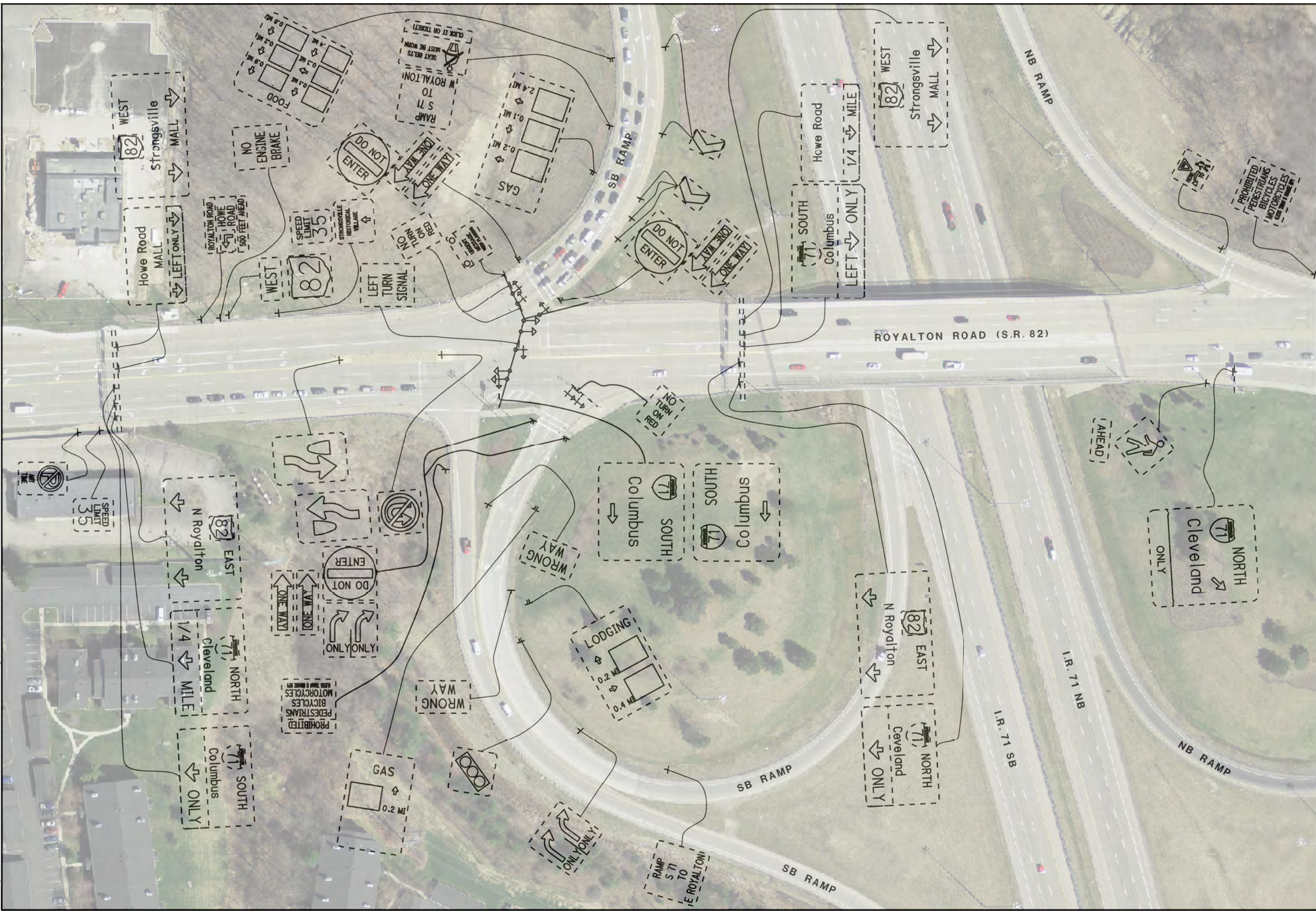
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HORIZONTAL SCALE IN FEET

**EXISTING CONDITIONS**  
**ROYALTON ROAD ( S.R. 82 )**



**EXISTING CONDITIONS  
ROYALTON ROAD ( S.R. 82 )**

**CUY - 82 - 2.93**



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**EXISTING CONDITIONS**  
**ROYALTON ROAD ( S.R. 82 )**

**CUY - 82 - 2.93**

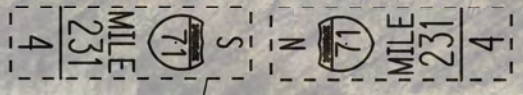
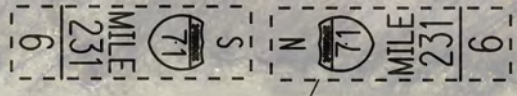
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**EXISTING CONDITIONS**  
**ROYALTON ROAD ( S.R. 82 )**

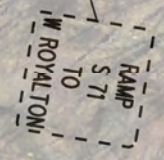
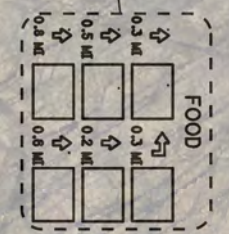
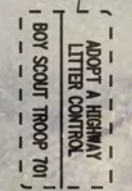
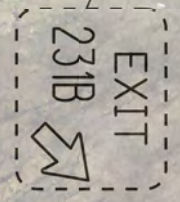
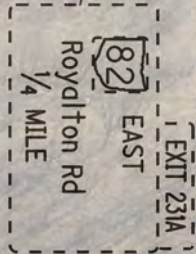


I.R. 71 NB

I.R. 71 SB

NB RAMP

SB RAMP

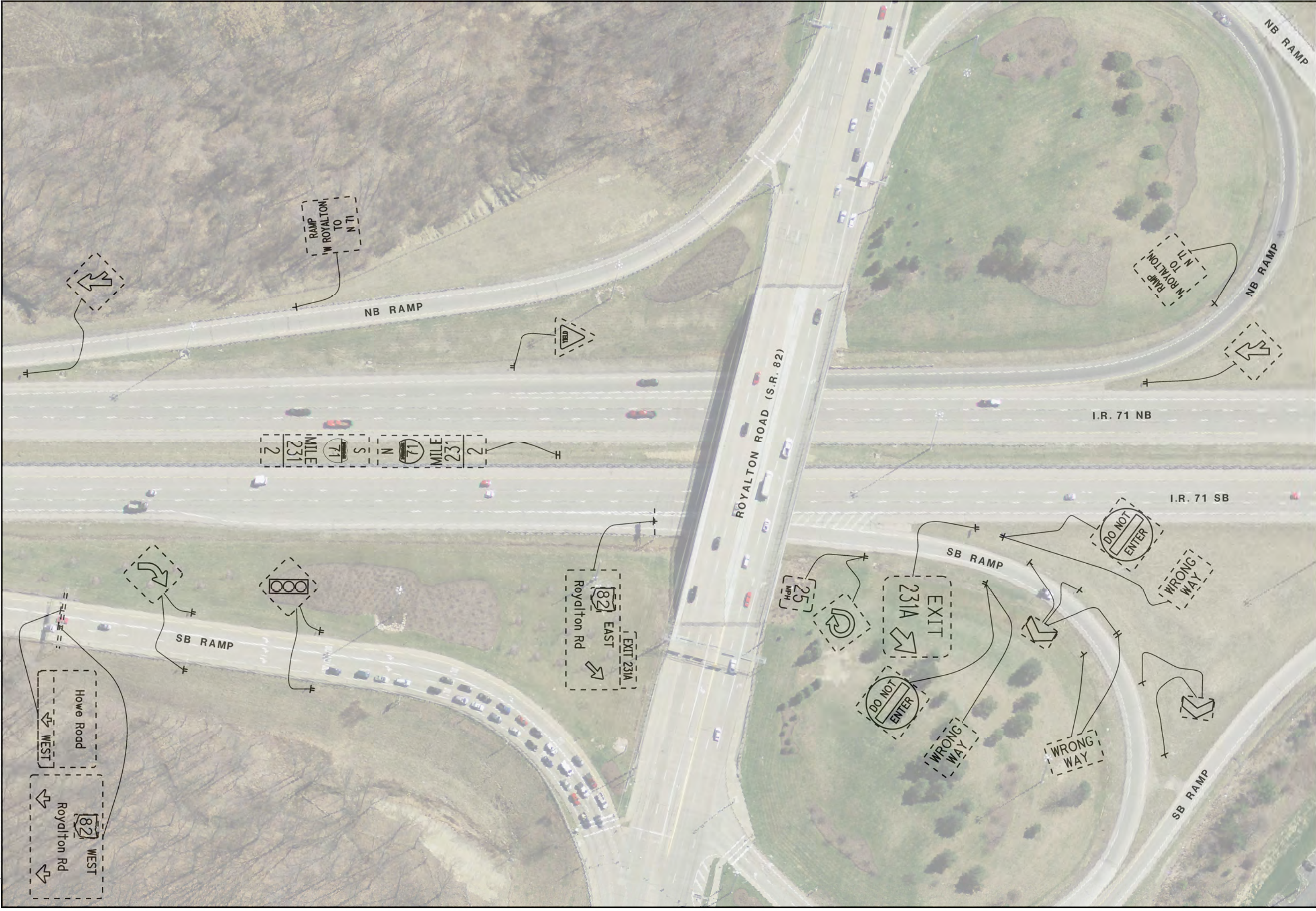


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HORIZONTAL SCALE IN FEET

EXISTING CONDITIONS  
INTERSTATE 71 / S.R. 82

CUY-82-2-93

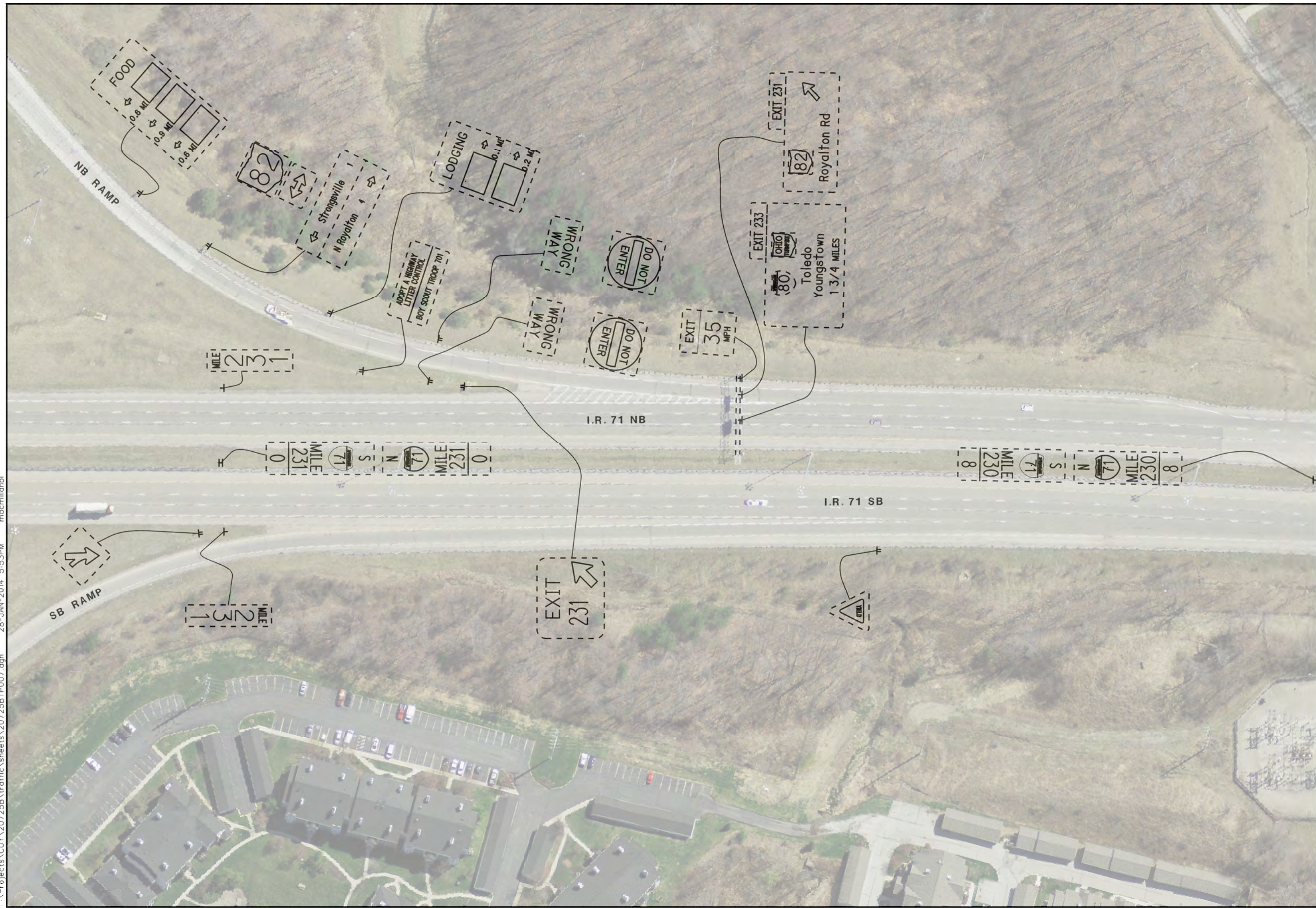


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  HORIZONTAL SCALE IN FEET			

**EXISTING CONDITIONS**  
**INTERSTATE 71 / S.R. 82**

**CUY-82-2.93**





## **Appendix B**

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### **Origin Destination Study**



A VETERAN-OWNED  
SMALL BUSINESS

**CORPORATE OFFICE**  
**Baltimore, MD**

Suite H  
9900 Franklin Square Drive  
Baltimore, Maryland 21236  
410.931.6600  
fax: 410.931.6601  
1.800.583.8411

**FIELD OFFICE LOCATIONS**

Arkansas  
Maryland  
New York  
Texas  
Virginia

January 3, 2014

Stephen Gage, P.E.  
Parsons Brinckerhoff  
614 W. Superior Avenue  
Rockefeller Building, Suite 400  
Cleveland, OH 44113

Dear Mr. Gage:

On November 21, 2013 The Traffic Group, Inc. conducted an automated license plate recognition (ALPR) study for Parsons Brinckerhoff in Strongsville, Ohio. The study was collected from 6:30 am to 9:30 am and from 3:30 pm to 6:30 pm. We installed ALPR cameras at 4 locations:

- Eastbound SR 82 West of Howe Road
- Northbound Howe Road South of SR 82
- Eastbound SR 82 to Southbound I-71
- Eastbound SR 82 to Northbound I-71

The goal of the project was to understand the travel patterns to I-71 from the west (SR 82 and Howe Road).

The assumption was that whatever vehicles did not enter I-71 from the west continued travel eastbound along SR 82. After our license plate matching process was complete, it was determined that the number of vehicles continuing along SR 82 Eastbound past I-71 was not realistic. The explanation is that not all vehicles are matched to all stations because of the limitations with the technology. While we typically collect 90% of license plate numbers, our experience has shown we only match 50% to 70% of the license plates. The reason is it is possible to collect the license plate number at one station and not another. For this reason, we have reduced the amount of traffic traveling to station E (SR 82 East of I-71) by 40%. This is a conservative reduction and more actually represents the traffic traveling eastbound from the west past I-71.

The following table illustrates how we came to this reduction:

Location	Period	# of plates recorded	# of plates matched	% of plates matched
Station C	AM	764	392	51%
Station C	PM	1378	639	46%
Station D	AM	3014	2016	67%
Station D	PM	2284	1541	67%

The average match at Station C and D is 58% thus a 40% reduction to Station E is appropriate.

The Traffic Group, Inc. has been collecting ALPR studies since 2003 and this match and collection percentage is consistent.

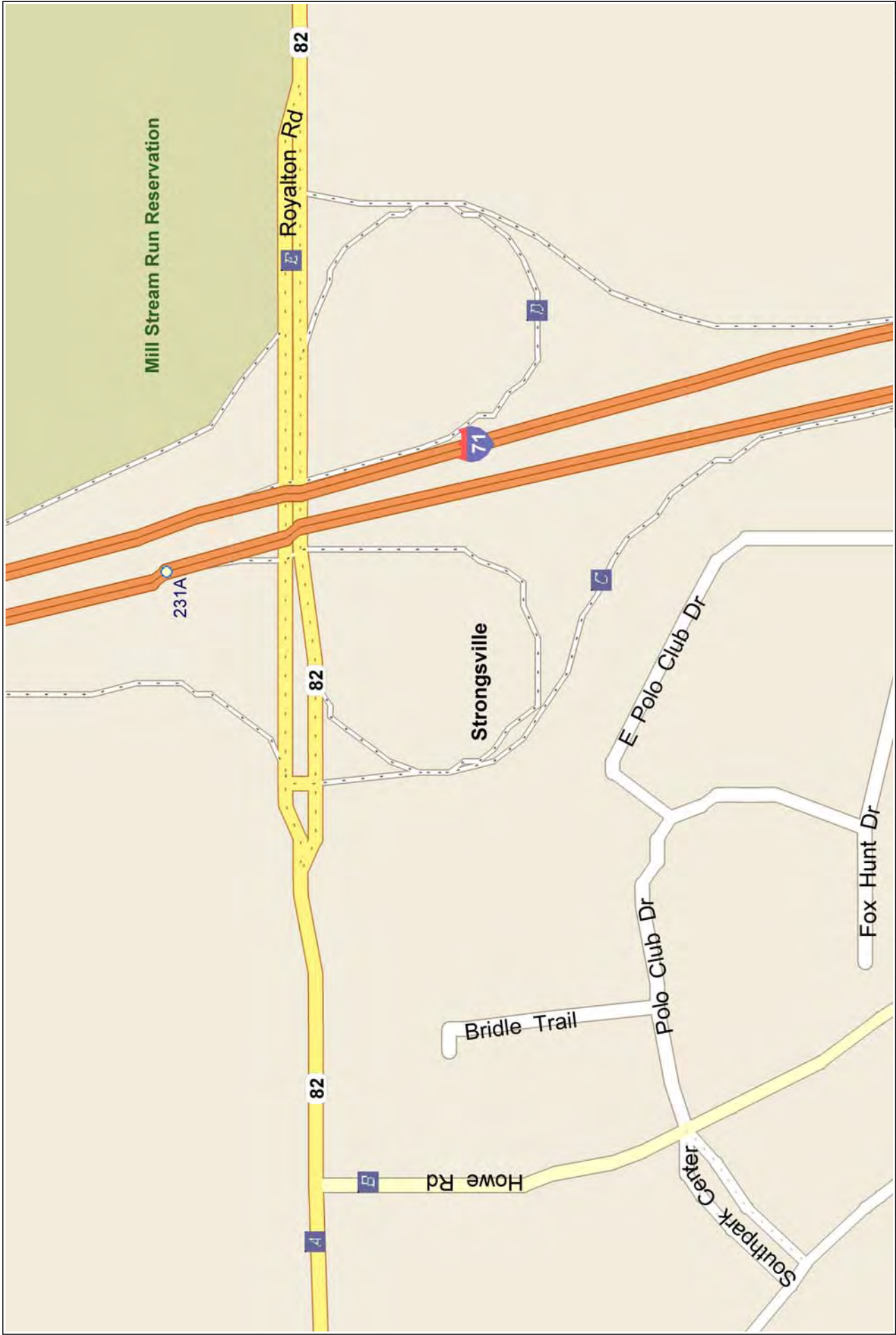
If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, reading "Anthony Guckert" with a small star-like flourish at the end.

Anthony Guckert  
Senior Vice President – Data Division

Strongsville\_ALPR



0 yds 100 200 300

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Friday, December 13, 2013

Survey Conducted 11/21/2013, Time Period = AM

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	326	799	826	1951
B	66	1307	518	1891

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	8%	20%	72%	
B	2%	44%	53%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.trafficgroup.com)

Friday, December 13, 2013

Survey Conducted 11/21/2013, Time Period = PM

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	470	825	1254	2549
B	169	716	529	1414

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E
A	12%	20%	68%
B	6%	26%	68%

(to)

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time Period = AM + PM

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	796	1624	2080	4500
B	235	2023	1048	3306

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	18%	36%	46%	
B	7%	61%	32%	



# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 06:30 - 06:45

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	12	86	58	156
B	4	93	53	150

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	8%	55%	37%	
B	3%	62%	35%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 06:45 - 7:00

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	27	72	71	170
B	1	133	58	192

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	16%	42%	42%	
B	1%	69%	30%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 07:00 - 07:15

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	31	95	66	192
B	8	136	54	198

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	16%	49%	34%	
B	4%	69%	27%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 07:15 - 07:30

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	29	87	71	187
B	5	121	50	176

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	16%	47%	38%	
B	3%	69%	28%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 07:30 - 07:45

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	39	69	71	179
B	6	133	41	180

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	22%	39%	40%	
B	3%	74%	23%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 07:45 - 8:00

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	36	54	76	166
B	4	100	53	157

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	22%	33%	46%	
B	3%	64%	34%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 08:00 - 08:15

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	27	62	64	153
B	6	127	37	170

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	18%	41%	42%	
B	4%	75%	22%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 08:15 - 08:30

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	31	67	72	170
B	7	129	34	170

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	18%	39%	42%	
B	4%	76%	20%	

(from)



# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 08:30 - 08:45

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	22	68	69	159
B	8	93	23	124

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	14%	43%	43%	
B	6%	75%	19%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.trafficgroup.com)

Survey Conducted 11/21/2013, Time = 08:45 - 9:00

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	30	54	70	154
B	5	102	36	143

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	19%	35%	45%	
B	3%	71%	25%	

(from)

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# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 09:00 - 09:15

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	20	48	56	124
B	2	82	39	123

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	16%	39%	45%	
B	2%	67%	32%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 09:15 - 09:30

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	22	37	82	141
B	10	58	40	108

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	16%	26%	58%	
B	9%	54%	37%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 15:30 - 15:45

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	47	75	93	215
B	8	45	44	97

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	22%	35%	43%	
B	8%	46%	45%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 15:45 - 16:00

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	43	61	115	219
B	17	60	44	121

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	20%	28%	53%	
B	14%	50%	36%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 16:00 - 16:15

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	42	82	98	222
B	12	59	47	118

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	19%	37%	44%	
B	10%	50%	40%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 16:15 - 16:30

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	30	67	105	202
B	15	87	31	133

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	15%	33%	52%	
B	11%	65%	23%	

(from)

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# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 16:30 - 16:45

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	50	98	103	251
B	13	69	33	115

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	20%	39%	41%	
B	11%	60%	29%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 16:45 - 17:00

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	44	77	107	228
B	9	71	30	110

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	19%	34%	47%	
B	8%	65%	27%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 17:00 - 17:15

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	34	92	100	226
B	14	67	50	131

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	15%	41%	44%	
B	11%	51%	38%	

(from)

C:\alpr\Strongsville OH ALPR\DATA Table.xlsx, Hour1700

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 17:15 - 17:30

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	39	78	115	232
B	29	65	67	161

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	17%	34%	50%	
B	18%	40%	42%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 17:30 - 17:45

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	39	51	115	205
B	19	39	55	113

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	19%	25%	56%	
B	17%	35%	49%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 17:45 - 18:00

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	39	45	98	182
B	14	57	30	101

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	21%	25%	54%	
B	14%	56%	30%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 18:00 - 18:15

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	39	56	92	187
B	7	53	49	109

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	21%	30%	49%	
B	6%	49%	45%	

(from)

# Strongsville Ohio Traffic Study - OD Match Summary Table

[The Traffic Group, Inc.®](http://www.thetrafficgroup.com)

Survey Conducted 11/21/2013, Time = 18:15 - 18:30

## Number of License Plates Captured at Downstream Survey Site

	C	D	E	Total Matched (to)
A	24	43	113	180
B	12	44	49	105

(from)

## % of License Plates Matched at Downstream Survey Site

	C	D	E	(to)
A	13%	24%	63%	
B	11%	42%	47%	

(from)



## **Appendix C**

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### **Synchro Analysis**

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	662	0	0	1362	266	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.959	
Flt Protected					0.965	
Satd. Flow (prot)	3438	0	0	4893	3188	0
Flt Permitted					0.965	
Satd. Flow (perm)	3438	0	0	4893	3188	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					45	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.67	0.78
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	720	0	0	1497	397	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	720	0	0	1497	546	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	86.0			86.0	54.0	
Total Split (%)	61.4%			61.4%	38.6%	
Maximum Green (s)	80.2			80.2	48.0	
Yellow Time (s)	3.6			3.6	3.0	

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	102.0			102.6	29.0	
Actuated g/C Ratio	0.73			0.73	0.21	
v/c Ratio	0.29			0.42	0.78	
Control Delay	11.0			8.0	56.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	11.0			8.0	56.2	
LOS	B			A	E	
Approach Delay	11.0			8.0	56.2	
Approach LOS	B			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 23 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 18.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 45.4%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1717	230	107	739	0	0	0	318	0	908	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.55	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850		0.850	
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	2986	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	2986	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			226									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		471			925		
Travel Time (s)		16.9			18.6		7.1			14.0		
Peak Hour Factor	0.92	0.85	0.77	0.76	0.77	0.92	0.92	0.92	0.89	0.92	0.82	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		97.0	20.0	23.0	76.0							44.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		69.3%	14.3%	16.4%	54.3%							31%
Maximum Green (s)		90.4	13.4	16.4	69.4							37.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		90.4	110.4	16.4	71.1				37.0			55.7
Actuated g/C Ratio		0.65	0.79	0.12	0.51				0.26			0.40
v/c Ratio		1.05	0.24	0.71	0.39				0.51			0.81
Control Delay		47.1	1.6	82.3	23.6				46.8			42.7
Queue Delay		0.0	0.0	0.0	0.0				0.0			0.0
Total Delay		47.1	1.6	82.3	23.6				46.8			42.7
LOS		D	A	F	C				D			D
Approach Delay		41.2			31.1							
Approach LOS		D			C							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 24 (17%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.05  
 Intersection Signal Delay: 39.7  
 Intersection LOS: D  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	14%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

# Lanes, Volumes, Timings

## 3: Howe Road & SR 82 Roylton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	1062	59	400	1227	48	116	32	846	39	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	570		250	300		0	110		0
Storage Lanes	2		0	1		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.50	0.91	0.97	0.95	1.00	0.95	0.95	*0.61	0.97	1.00	1.00
Frt		0.982				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (prot)	3467	2668	0	3433	3438	1583	1665	1742	1951	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (perm)	3467	2668	0	3433	3438	1583	1665	1742	1951	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		10				79						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			665				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.78	0.87	0.36	0.81	0.86	0.80	0.85	0.50	0.92	0.81	0.38	0.46
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	36	1221	164	494	1427	60	136	64	920	48	8	24
Shared Lane Traffic (%)							28%					
Lane Group Flow (vph)	36	1385	0	494	1427	60	98	102	920	48	8	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	81	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	81	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	16.0	70.0		28.0	82.0	20.0	22.0	22.0		20.0	20.0	16.0



Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	11.4%	50.0%		20.0%	58.6%	14.3%	15.7%	15.7%		14.3%	14.3%	11.4%
Maximum Green (s)	10.0	63.4		22.0	75.4	13.4	15.4	15.4		13.4	13.4	10.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effct Green (s)	11.4	65.4		24.0	80.6	93.5	23.7	23.7	51.7	11.6	11.6	24.3
Actuated g/C Ratio	0.08	0.47		0.17	0.58	0.67	0.17	0.17	0.37	0.08	0.08	0.17
v/c Ratio	0.13	1.11		0.84	0.72	0.06	0.35	0.35	1.28	0.17	0.05	0.06
Control Delay	58.4	92.6		63.8	13.5	0.6	57.4	57.2	172.4	61.3	60.0	0.3
Queue Delay	0.0	0.0		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.4	92.6		63.8	13.6	0.6	57.4	57.2	172.4	61.3	60.0	0.3
LOS	E	F		E	B	A	E	E	F	E	E	A
Approach Delay		91.7			25.7			151.9			42.9	
Approach LOS		F			C			F			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.28  
 Intersection Signal Delay: 77.1  
 Intersection LOS: E  
 Intersection Capacity Utilization 72.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	1050	39	41	1166	60	4	1	11	59	3	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25		25			
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	0.95	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.994			0.988			0.910	0.850		0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4874	0	3467	3378	0	3467	1626	1519	1787	1693	0
Flt Permitted	0.121			0.950			0.950			0.950		
Satd. Flow (perm)	225	4874	0	3467	3378	0	3467	1626	1519	1787	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			9			6	75			16
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.75	0.95	0.81	0.79	0.81	0.47	0.50	0.25	0.69	0.70	0.38	0.63
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	28	1105	48	52	1440	128	8	4	16	84	8	16
Shared Lane Traffic (%)									39%			
Lane Group Flow (vph)	28	1153	0	52	1568	0	8	10	10	84	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	18.0	69.0		18.0	69.0		14.0	37.0	18.0	16.0		39.0

Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	12.9%	49.3%		12.9%	49.3%		10.0%	26.4%	12.9%	11.4%	27.9%	
Maximum Green (s)	12.0	62.4		12.0	62.4		8.0	31.0	12.0	10.0	33.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	112.9	105.8		9.2	109.4		8.2	11.8	12.4	10.9	11.5	
Actuated g/C Ratio	0.81	0.76		0.07	0.78		0.06	0.08	0.09	0.08	0.08	
v/c Ratio	0.10	0.31		0.23	0.59		0.04	0.07	0.05	0.61	0.16	
Control Delay	2.6	4.1		81.3	2.0		62.5	40.8	0.4	81.1	33.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	2.6	4.1		81.3	2.0		62.5	40.8	0.4	81.1	33.8	
LOS	A	A		F	A		E	D	A	F	C	
Approach Delay		4.1			4.6			32.6			70.6	
Approach LOS		A			A			C			E	

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	29 (21%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle:	125
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.61
Intersection Signal Delay:	7.1
Intersection LOS:	A
Intersection Capacity Utilization:	51.8%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↔		↘	↘
Volume (vph)	54	1028	1082	67	47	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	3382	0	1593	1398
Flt Permitted	0.145				0.950	
Satd. Flow (perm)	273	4893	3382	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			9			56
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.61	0.92	0.80	0.80	0.84	0.71
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	89	1117	1352	84	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	1117	1436	0	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	108.0	92.0		32.0	32.0
Total Split (%)	11.4%	77.1%	65.7%		22.9%	22.9%
Maximum Green (s)	10.0	101.9	85.9		26.0	26.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	121.2	122.1	108.1		12.4	12.4
Actuated g/C Ratio	0.87	0.87	0.77		0.09	0.09
v/c Ratio	0.27	0.26	0.55		0.40	0.32
Control Delay	4.5	1.6	0.9		68.5	19.1
Queue Delay	0.0	0.0	0.1		0.0	0.0
Total Delay	4.5	1.6	1.0		68.5	19.1
LOS	A	A	A		E	B
Approach Delay		1.8	1.0		43.8	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 30 (21%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 3.1  
 Intersection LOS: A  
 Intersection Capacity Utilization 58.1%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1040	106	51	1016	133	31	8	17	5	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.983			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1805	4893	1599	1787	3366	0	3467	1707	0	1715	1600	1652
Flt Permitted	0.146			0.222			0.950			0.950	0.950	
Satd. Flow (perm)	277	4893	1599	418	3366	0	3467	1707	0	1715	1600	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143		15			36				75
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.75	0.93	0.74	0.75	0.82	0.85	0.78	0.40	0.47	0.42	0.92	0.38
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	56	1118	143	68	1239	156	40	20	36	12	0	16
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	56	1118	143	68	1395	0	40	56	0	6	6	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	79.0	33.0	12.0	80.0		33.0	33.0		16.0	16.0	11.0
Total Split (%)	7.9%	56.4%	23.6%	8.6%	57.1%		23.6%	23.6%		11.4%	11.4%	7.9%
Maximum Green (s)	5.0	72.4	27.0	6.0	73.4		27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effect Green (s)	109.8	102.7	118.7	110.6	103.0		12.2	12.2		12.0	12.0	12.7
Actuated g/C Ratio	0.78	0.73	0.85	0.79	0.74		0.09	0.09		0.09	0.09	0.09
v/c Ratio	0.18	0.31	0.10	0.16	0.56		0.13	0.31		0.04	0.04	0.07
Control Delay	2.5	2.5	0.2	2.1	2.7		60.0	31.9		59.7	59.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	2.5	2.5	0.2	2.1	2.7		60.0	31.9		59.7	59.7	0.7
LOS	A	A	A	A	A		E	C		E	E	A
Approach Delay		2.2			2.7			43.6			26.0	
Approach LOS		A			A			D			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 33 (24%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 4.0  
 Intersection LOS: A  
 Intersection Capacity Utilization 55.3%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	1665	0	0	1260	327	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.947	
Flt Protected					0.969	
Satd. Flow (prot)	3438	0	0	4893	3161	0
Flt Permitted					0.969	
Satd. Flow (perm)	3438	0	0	4893	3161	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					30	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.86	0.82
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	1810	0	0	1355	380	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1810	0	0	1355	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	100.0			100.0	40.0	
Total Split (%)	71.4%			71.4%	28.6%	
Maximum Green (s)	94.2			94.2	34.0	
Yellow Time (s)	3.6			3.6	3.0	



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	100.5			101.1	30.5	
Actuated g/C Ratio	0.72			0.72	0.22	
v/c Ratio	0.73			0.38	0.83	
Control Delay	9.0			8.2	59.6	
Queue Delay	0.0			0.0	0.0	
Total Delay	9.0			8.2	59.6	
LOS	A			A	E	
Approach Delay	9.0			8.2	59.6	
Approach LOS	A			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 90 (64%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 16.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1850	381	85	1188	0	0	0	701	0	1779	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.50	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850			0.850
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	2714	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	2714	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No			No
Satd. Flow (RTOR)			438									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		669			1107		
Travel Time (s)		16.9			18.6		10.1			16.8		
Peak Hour Factor	0.92	0.87	0.87	0.46	0.86	0.92	0.92	0.92	0.90	0.92	0.96	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	Perm	Prot	NA				pt+ov		custom	
Protected Phases		6		5	2				4.5		1.4	1
Permitted Phases		6	6		2						1.4	
Detector Phase		6	6	5	2				4.5		1.4	
Switch Phase												
Minimum Initial (s)		25.0	25.0	10.0	25.0							1.0
Minimum Split (s)		32.0	32.0	17.0	32.0							20.0
Total Split (s)		95.0	95.0	25.0	56.0							64.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

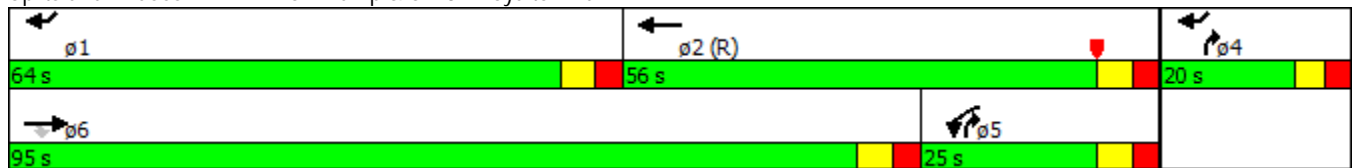


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		67.9%	67.9%	17.9%	40.0%							46%
Maximum Green (s)		88.4	88.4	18.4	49.4							57.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead	Lead	Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	5.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0	7.0		7.0							
Flash Dont Walk (s)		12.0	12.0		10.0							
Pedestrian Calls (#/hr)		0	0		0							
Act Effect Green (s)		88.4	88.4	18.4	49.4			39.0			77.4	
Actuated g/C Ratio		0.63	0.63	0.13	0.35			0.28			0.55	
v/c Ratio		1.24	0.39	0.83	0.80			1.05			0.97	
Control Delay		139.4	4.0	77.6	35.7			96.4			45.9	
Queue Delay		0.0	0.0	0.0	0.0			0.0			41.6	
Total Delay		139.4	4.0	77.6	35.7			96.4			87.5	
LOS		F	A	E	D			F			F	
Approach Delay		116.3			40.6							
Approach LOS		F			D							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 45 (32%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.24  
 Intersection Signal Delay: 88.6      Intersection LOS: F  
 Intersection Capacity Utilization Err%      ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	14%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

# Lanes, Volumes, Timings

## 3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	1412	77	867	1779	321	170	102	597	222	140	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	570		250	300		0	110		0
Storage Lanes	2		0	1		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.70	0.91	0.97	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	3757	0	3433	3438	1583	1752	1881	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3467	3757	0	3433	3438	1583	1752	1881	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		8				209						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			667				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.88	0.82	0.53	0.80	0.95	0.69	0.92	0.88	0.90	0.80	0.83	0.69
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	217	1722	145	1084	1873	465	185	116	663	278	169	351
Shared Lane Traffic (%)												
Lane Group Flow (vph)	217	1867	0	1084	1873	465	185	116	663	278	169	351
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	81	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	81	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	20.0	54.0		45.0	79.0	19.0	22.0	22.0		19.0	19.0	20.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014

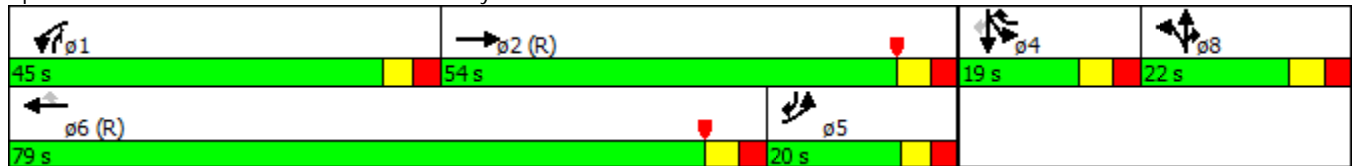


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	14.3%	38.6%		32.1%	56.4%	13.6%	15.7%	15.7%		13.6%	13.6%	14.3%
Maximum Green (s)	14.0	47.4		39.0	72.4	12.4	15.4	15.4		12.4	12.4	14.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effct Green (s)	16.0	49.4		41.0	74.4	88.8	17.0	17.0	62.0	14.0	14.0	34.6
Actuated g/C Ratio	0.11	0.35		0.29	0.53	0.63	0.12	0.12	0.44	0.10	0.10	0.25
v/c Ratio	0.55	1.40		1.08	1.03	0.43	0.87	0.51	0.53	0.81	0.90	0.72
Control Delay	59.9	219.0		91.7	54.8	3.2	96.1	66.1	30.4	80.2	105.4	39.6
Queue Delay	0.0	0.0		0.0	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	219.0		91.7	77.3	3.2	96.1	66.1	30.4	80.2	105.4	39.6
LOS	E	F		F	E	A	F	E	C	F	F	D
Approach Delay		202.5			71.8			47.3			67.7	
Approach LOS		F			E			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.40  
 Intersection Signal Delay: 105.6 Intersection LOS: F  
 Intersection Capacity Utilization 88.3% ICU Level of Service E  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	1227	52	328	1414	58	95	7	257	102	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	0.95	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.993			0.992			0.859	0.850		0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4869	0	3467	3387	0	3467	1535	1519	1787	1723	0
Flt Permitted	0.105			0.950			0.950			0.950		
Satd. Flow (perm)	196	4869	0	3467	3387	0	3467	1535	1519	1787	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			5			148	75			36
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.60	0.85	0.76	0.90	0.95	0.69	0.77	0.77	0.85	0.77	0.64	0.86
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	60	1444	68	364	1488	84	123	9	302	132	28	36
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	60	1512	0	364	1572	0	123	157	154	132	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	17.0	61.0		25.0	69.0		15.0	36.0	25.0	18.0		39.0



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	12.1%	43.6%		17.9%	49.3%		10.7%	25.7%	17.9%	12.9%	27.9%	
Maximum Green (s)	11.0	54.4		19.0	62.4		9.0	30.0	19.0	12.0	33.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	84.7	75.4		21.4	90.5		14.4	12.6	38.2	13.1	13.7	
Actuated g/C Ratio	0.60	0.54		0.15	0.65		0.10	0.09	0.27	0.09	0.10	
v/c Ratio	0.28	0.58		0.69	0.72		0.34	0.58	0.33	0.79	0.32	
Control Delay	13.6	25.5		71.9	6.5		63.5	19.3	21.4	92.9	33.2	
Queue Delay	0.0	0.2		0.0	0.1		0.0	0.0	0.0	0.0	0.0	
Total Delay	13.6	25.7		71.9	6.6		63.5	19.3	21.4	92.9	33.2	
LOS	B	C		E	A		E	B	C	F	C	
Approach Delay		25.3			18.9			32.6			73.4	
Approach LOS		C			B			C			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 16 (11%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 25.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 69.3%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗↗↗	↖↖		↘	↘
Volume (vph)	89	1172	1445	112	99	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	3375	0	1593	1398
Flt Permitted	0.086				0.950	
Satd. Flow (perm)	162	4893	3375	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			13			147
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.86	0.88	0.92	0.80	0.88	0.76
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	103	1332	1571	140	112	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	1332	1711	0	112	163
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	110.0	94.0		30.0	30.0
Total Split (%)	11.4%	78.6%	67.1%		21.4%	21.4%
Maximum Green (s)	10.0	103.9	87.9		24.0	24.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	114.1	114.0	100.0		16.3	16.3
Actuated g/C Ratio	0.82	0.81	0.71		0.12	0.12
v/c Ratio	0.43	0.33	0.71		0.61	0.56
Control Delay	23.3	3.7	4.9		71.9	18.5
Queue Delay	0.0	0.0	0.3		0.0	0.0
Total Delay	23.3	3.7	5.1		71.9	18.5
LOS	C	A	A		E	B
Approach Delay		5.1	5.1		40.2	
Approach LOS		A	A		D	

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	44 (31%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	7.9
Intersection LOS:	A
Intersection Capacity Utilization	69.6%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1079	558	143	1428	3	400	1	149	88	11	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.999			0.854				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.963	
Satd. Flow (prot)	1805	4893	1599	1787	3403	0	3467	1607	0	1715	1622	1652
Flt Permitted	0.072			0.121			0.950			0.950	0.963	
Satd. Flow (perm)	137	4893	1599	228	3403	0	3467	1607	0	1715	1622	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			546		1			155				75
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.63	0.78	0.96	0.83	0.93	0.38	0.95	0.25	0.93	0.55	0.55	0.64
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	8	1383	581	172	1535	8	421	4	160	160	20	72
Shared Lane Traffic (%)										44%		
Lane Group Flow (vph)	8	1383	581	172	1543	0	421	164	0	90	90	72
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	16.0	73.0	33.0	18.0	75.0		33.0	33.0		16.0	16.0	16.0
Total Split (%)	11.4%	52.1%	23.6%	12.9%	53.6%		23.6%	23.6%		11.4%	11.4%	11.4%
Maximum Green (s)	10.0	66.4	27.0	12.0	68.4		27.0	27.0		10.0	10.0	10.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effect Green (s)	80.0	72.0	99.8	88.8	79.1		27.2	27.2		12.0	12.0	19.4
Actuated g/C Ratio	0.57	0.51	0.71	0.63	0.56		0.19	0.19		0.09	0.09	0.14
v/c Ratio	0.05	0.55	0.45	0.61	0.80		0.63	0.38		0.61	0.65	0.25
Control Delay	14.4	25.7	2.2	27.9	13.6		56.0	10.6		80.0	83.5	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.5		0.0	0.0		0.0	0.0	0.0
Total Delay	14.4	25.7	2.2	27.9	14.1		56.0	10.6		80.0	83.5	8.1
LOS	B	C	A	C	B		E	B		E	F	A
Approach Delay		18.8			15.5			43.3			60.7	
Approach LOS		B			B			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 23.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 77.3%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	662	0	0	1362	266	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.959	
Flt Protected					0.965	
Satd. Flow (prot)	3438	0	0	4893	3188	0
Flt Permitted					0.965	
Satd. Flow (perm)	3438	0	0	4893	3188	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					45	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.67	0.78
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	720	0	0	1497	397	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	720	0	0	1497	546	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	86.0			86.0	54.0	
Total Split (%)	61.4%			61.4%	38.6%	
Maximum Green (s)	80.2			80.2	48.0	
Yellow Time (s)	3.6			3.6	3.0	

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	102.0			102.6	29.0	
Actuated g/C Ratio	0.73			0.73	0.21	
v/c Ratio	0.29			0.42	0.78	
Control Delay	4.1			8.0	56.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	4.1			8.0	56.2	
LOS	A			A	E	
Approach Delay	4.1			8.0	56.2	
Approach LOS	A			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 73 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 16.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 45.4%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1717	230	107	739	0	0	0	318	0	908	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.71	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850		0.850	
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			269									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		471			925		
Travel Time (s)		16.9			18.6		7.1			14.0		
Peak Hour Factor	0.92	0.85	0.77	0.76	0.77	0.92	0.92	0.92	0.89	0.92	0.82	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		95.0	20.0	25.0	78.0							42.0



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		67.9%	14.3%	17.9%	55.7%							30%
Maximum Green (s)		88.4	13.4	18.4	71.4							35.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		88.4	108.4	18.4	72.4			39.0			54.4	
Actuated g/C Ratio		0.63	0.77	0.13	0.52			0.28			0.39	
v/c Ratio		0.83	0.24	0.63	0.38			0.48			0.83	
Control Delay		17.0	1.3	64.7	15.2			44.7			44.9	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay		17.0	1.3	64.7	15.2			44.7			44.9	
LOS		B	A	E	B			D			D	
Approach Delay		15.0			21.5							
Approach LOS		B			C							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 25.4      Intersection LOS: C  
 Intersection Capacity Utilization Err%      ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	14%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

# Lanes, Volumes, Timings

## 3: Howe Road & SR 82 Roylton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	1062	59	400	1227	48	116	32	846	39	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	570		250	300		0	110		0
Storage Lanes	2		0	1		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.75	0.91	0.97	0.95	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.982				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (prot)	3467	4003	0	3433	3438	1583	1665	1742	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (perm)	3467	4003	0	3433	3438	1583	1665	1742	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		16				79						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			665				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.78	0.87	0.36	0.81	0.86	0.80	0.85	0.50	0.92	0.81	0.38	0.46
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	36	1221	164	494	1427	60	136	64	920	48	8	24
Shared Lane Traffic (%)							28%					
Lane Group Flow (vph)	36	1385	0	494	1427	60	98	102	920	48	8	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	81	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	81	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	20.0	64.0		32.0	76.0	20.0	24.0	24.0		20.0	20.0	20.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014

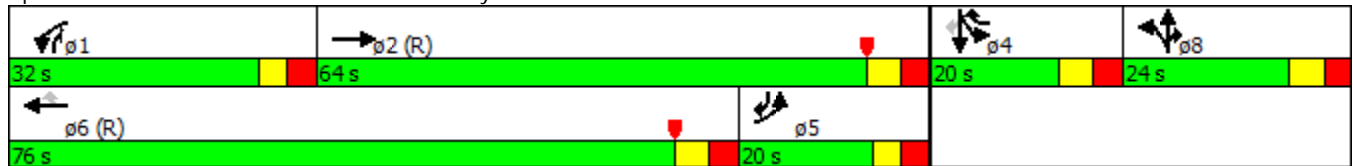


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	14.3%	45.7%		22.9%	54.3%	14.3%	17.1%	17.1%		14.3%	14.3%	14.3%
Maximum Green (s)	14.0	57.4		26.0	69.4	13.4	17.4	17.4		13.4	13.4	14.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effect Green (s)	14.6	60.9		27.0	75.8	88.8	25.3	25.3	56.3	11.6	11.6	27.5
Actuated g/C Ratio	0.10	0.44		0.19	0.54	0.63	0.18	0.18	0.40	0.08	0.08	0.20
v/c Ratio	0.10	0.79		0.75	0.77	0.06	0.33	0.32	0.81	0.17	0.05	0.06
Control Delay	60.2	40.7		56.4	17.0	0.3	55.2	55.0	44.7	61.3	60.0	0.3
Queue Delay	0.0	0.0		0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.2	40.7		56.4	17.1	0.3	55.2	55.0	44.7	61.3	60.0	0.3
LOS	E	D		E	B	A	E	E	D	E	E	A
Approach Delay		41.2			26.4			46.6			42.9	
Approach LOS		D			C			D			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 36.2      Intersection LOS: D  
 Intersection Capacity Utilization 72.6%      ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	1050	39	41	1166	60	4	1	11	59	3	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	0.95	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.994			0.988			0.910	0.850		0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4874	0	3467	3378	0	3467	1626	1519	1787	1693	0
Flt Permitted	0.124			0.950			0.950			0.950		
Satd. Flow (perm)	231	4874	0	3467	3378	0	3467	1626	1519	1787	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			10			6	75			16
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.75	0.95	0.81	0.79	0.81	0.47	0.50	0.25	0.69	0.70	0.38	0.63
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	28	1105	48	52	1440	128	8	4	16	84	8	16
Shared Lane Traffic (%)									39%			
Lane Group Flow (vph)	28	1153	0	52	1568	0	8	10	10	84	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	77.0		12.0	77.0		12.0	37.0	12.0	14.0		39.0

Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	55.0%		8.6%	55.0%		8.6%	26.4%	8.6%	10.0%	27.9%	
Maximum Green (s)	6.0	70.4		6.0	70.4		6.0	31.0	6.0	8.0	33.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	114.4	107.4		9.2	111.0		7.8	11.8	12.4	9.3	10.1	
Actuated g/C Ratio	0.82	0.77		0.07	0.79		0.06	0.08	0.09	0.07	0.07	
v/c Ratio	0.10	0.31		0.23	0.59		0.04	0.07	0.05	0.71	0.18	
Control Delay	3.0	4.4		79.6	1.4		63.2	40.8	0.4	94.6	35.1	
Queue Delay	0.0	0.0		0.0	0.2		0.0	0.0	0.0	0.0	0.0	
Total Delay	3.0	4.4		79.6	1.5		63.2	40.8	0.4	94.6	35.1	
LOS	A	A		E	A		E	D	A	F	D	
Approach Delay		4.4			4.0			32.8			81.4	
Approach LOS		A			A			C			F	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 33 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 7.3  
 Intersection LOS: A  
 Intersection Capacity Utilization 51.8%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↔		↘	↙
Volume (vph)	54	1028	1082	67	47	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	3382	0	1593	1398
Flt Permitted	0.145				0.950	
Satd. Flow (perm)	273	4893	3382	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			9			56
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.61	0.92	0.80	0.80	0.84	0.71
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	89	1117	1352	84	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	1117	1436	0	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	108.0	92.0		32.0	32.0
Total Split (%)	11.4%	77.1%	65.7%		22.9%	22.9%
Maximum Green (s)	10.0	101.9	85.9		26.0	26.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	121.2	122.1	108.1		12.4	12.4
Actuated g/C Ratio	0.87	0.87	0.77		0.09	0.09
v/c Ratio	0.27	0.26	0.55		0.40	0.32
Control Delay	4.5	1.3	1.1		68.5	19.1
Queue Delay	0.0	0.0	0.1		0.0	0.0
Total Delay	4.5	1.3	1.2		68.5	19.1
LOS	A	A	A		E	B
Approach Delay		1.5	1.2		43.8	
Approach LOS		A	A		D	

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	45 (32%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	3.1
Intersection LOS:	A
Intersection Capacity Utilization:	58.1%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1040	106	51	1016	133	31	8	17	5	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.983			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1805	4893	1599	1787	3366	0	3467	1707	0	1715	1600	1652
Flt Permitted	0.146			0.222			0.950			0.950	0.950	
Satd. Flow (perm)	277	4893	1599	418	3366	0	3467	1707	0	1715	1600	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143		15			36				75
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.75	0.93	0.74	0.75	0.82	0.85	0.78	0.40	0.47	0.42	0.92	0.38
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	56	1118	143	68	1239	156	40	20	36	12	0	16
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	56	1118	143	68	1395	0	40	56	0	6	6	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	79.0	33.0	12.0	80.0		33.0	33.0		16.0	16.0	11.0
Total Split (%)	7.9%	56.4%	23.6%	8.6%	57.1%		23.6%	23.6%		11.4%	11.4%	7.9%
Maximum Green (s)	5.0	72.4	27.0	6.0	73.4		27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effect Green (s)	109.8	102.7	118.7	110.6	103.0		12.2	12.2		12.0	12.0	12.7
Actuated g/C Ratio	0.78	0.73	0.85	0.79	0.74		0.09	0.09		0.09	0.09	0.09
v/c Ratio	0.18	0.31	0.10	0.16	0.56		0.13	0.31		0.04	0.04	0.07
Control Delay	6.7	9.0	1.2	1.8	2.6		60.0	31.9		59.7	59.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	6.7	9.0	1.2	1.8	2.6		60.0	31.9		59.7	59.7	0.7
LOS	A	A	A	A	A		E	C		E	E	A
Approach Delay		8.0			2.6			43.6			26.0	
Approach LOS		A			A			D			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 6.6  
 Intersection LOS: A  
 Intersection Capacity Utilization 55.3%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	1665	0	0	1260	327	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.947	
Flt Protected					0.969	
Satd. Flow (prot)	3438	0	0	4893	3161	0
Flt Permitted					0.969	
Satd. Flow (perm)	3438	0	0	4893	3161	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					30	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.86	0.82
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	1810	0	0	1355	380	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1810	0	0	1355	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	100.0			100.0	40.0	
Total Split (%)	71.4%			71.4%	28.6%	
Maximum Green (s)	94.2			94.2	34.0	
Yellow Time (s)	3.6			3.6	3.0	

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	100.5			101.1	30.5	
Actuated g/C Ratio	0.72			0.72	0.22	
v/c Ratio	0.73			0.38	0.83	
Control Delay	11.8			8.2	59.6	
Queue Delay	0.0			0.0	0.0	
Total Delay	11.8			8.2	59.6	
LOS	B			A	E	
Approach Delay	11.8			8.2	59.6	
Approach LOS	B			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 108 (77%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 18.0  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1850	381	85	1188	0	0	0	701	0	1779	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850			0.850
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			438									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		669			1107		
Travel Time (s)		16.9			18.6		10.1			16.8		
Peak Hour Factor	0.92	0.87	0.87	0.46	0.86	0.92	0.92	0.92	0.90	0.92	0.96	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	Perm	Prot	NA				pt+ov		custom	
Protected Phases		6		5	2				4.5		1.4	1
Permitted Phases		6	6		2						1.4	
Detector Phase		6	6	5	2				4.5		1.4	
Switch Phase												
Minimum Initial (s)		25.0	25.0	10.0	25.0							1.0
Minimum Split (s)		32.0	32.0	17.0	32.0							20.0
Total Split (s)		83.0	83.0	28.0	53.0							58.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	29.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

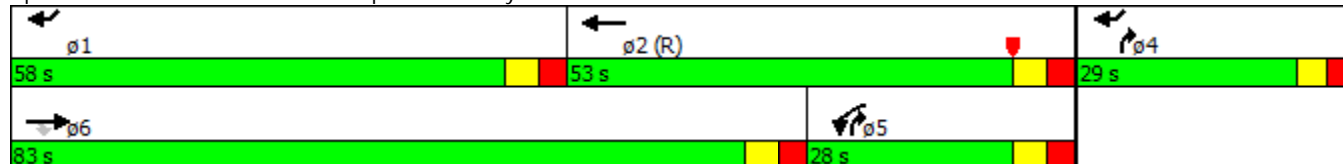


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		59.3%	59.3%	20.0%	37.9%							41%
Maximum Green (s)		76.4	76.4	21.4	46.4							51.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead	Lead	Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	5.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0	7.0		7.0							
Flash Dont Walk (s)		12.0	12.0		10.0							
Pedestrian Calls (#/hr)		0	0		0							
Act Effect Green (s)		76.4	76.4	21.4	46.4			51.0			80.4	
Actuated g/C Ratio		0.55	0.55	0.15	0.33			0.36			0.57	
v/c Ratio		0.79	0.42	0.71	0.85			0.81			0.94	
Control Delay		15.6	0.9	61.4	39.6			47.7			38.0	
Queue Delay		0.2	0.0	0.0	0.0			0.0			10.6	
Total Delay		15.8	0.9	61.4	39.6			47.7			48.7	
LOS		B	A	E	D			D			D	
Approach Delay		13.2			42.2							
Approach LOS		B			D							

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	60 (43%), Referenced to phase 2:WBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	33.6
Intersection LOS:	C
Intersection Capacity Utilization Err%	ICU Level of Service H
Analysis Period (min)	15

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd





Lane Group	ø4
Total Split (%)	21%
Maximum Green (s)	23.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	

### Lanes, Volumes, Timings

#### 3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	1412	77	867	1779	321	170	102	597	222	140	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	570		250	300		0	110		0
Storage Lanes	2		0	1		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (prot)	3467	4884	0	3433	3438	1583	1665	1757	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (perm)	3467	4884	0	3433	3438	1583	1665	1757	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		11				178						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			667				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.88	0.82	0.53	0.80	0.95	0.69	0.92	0.88	0.90	0.80	0.83	0.69
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	217	1722	145	1084	1873	465	185	116	663	278	169	351
Shared Lane Traffic (%)							20%					
Lane Group Flow (vph)	217	1867	0	1084	1873	465	148	153	663	278	169	351
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	81	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	81	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	14.0	54.0		46.0	86.0	20.0	20.0	20.0		20.0	20.0	14.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	10.0%	38.6%		32.9%	61.4%	14.3%	14.3%	14.3%		14.3%	14.3%	10.0%
Maximum Green (s)	8.0	47.4		40.0	79.4	13.4	13.4	13.4		13.4	13.4	8.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effct Green (s)	10.0	49.4		42.0	81.4	96.8	15.0	15.0	61.0	15.0	15.0	29.6
Actuated g/C Ratio	0.07	0.35		0.30	0.58	0.69	0.11	0.11	0.44	0.11	0.11	0.21
v/c Ratio	0.88	1.08		1.05	0.94	0.40	0.83	0.81	0.54	0.76	0.84	0.80
Control Delay	82.5	77.4		83.3	31.8	4.9	95.6	91.9	31.2	74.6	93.8	48.1
Queue Delay	0.0	0.0		0.0	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.5	77.4		83.3	46.7	4.9	95.6	91.9	31.2	74.6	93.8	48.1
LOS	F	E		F	D	A	F	F	C	E	F	D
Approach Delay		78.0			52.6			50.7			67.0	
Approach LOS		E			D			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 61.2  
 Intersection LOS: E  
 Intersection Capacity Utilization 87.2%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	1227	52	328	1414	58	95	7	257	102	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	0.95	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.993			0.992			0.859	0.850			0.916
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4869	0	3467	3387	0	3467	1535	1519	1787	1723	0
Flt Permitted	0.110			0.950			0.950			0.950		
Satd. Flow (perm)	205	4869	0	3467	3387	0	3467	1535	1519	1787	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			6			148	75			36
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.60	0.85	0.76	0.90	0.95	0.69	0.77	0.77	0.85	0.77	0.64	0.86
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	60	1444	68	364	1488	84	123	9	302	132	28	36
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	60	1512	0	364	1572	0	123	157	154	132	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	100		20	100		20	100	20	20	100	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0	39.0	
Total Split (s)	12.0	63.0		25.0	76.0		13.0	36.0	25.0	16.0	39.0	

Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	45.0%		17.9%	54.3%		9.3%	25.7%	17.9%	11.4%	27.9%	
Maximum Green (s)	6.0	56.4		19.0	69.4		7.0	30.0	19.0	10.0	33.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	86.5	77.2		21.4	92.3		12.6	12.6	38.2	11.3	13.7	
Actuated g/C Ratio	0.62	0.55		0.15	0.66		0.09	0.09	0.27	0.08	0.10	
v/c Ratio	0.27	0.56		0.69	0.70		0.40	0.58	0.33	0.92	0.32	
Control Delay	8.3	13.7		73.8	7.9		66.5	19.3	21.4	118.6	33.2	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	8.3	13.9		73.8	7.9		66.5	19.3	21.4	118.6	33.2	
LOS	A	B		E	A		E	B	C	F	C	
Approach Delay		13.7			20.3			33.4			90.7	
Approach LOS		B			C			C			F	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 23 (16%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 22.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 69.3%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	89	1172	1445	112	99	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	3375	0	1593	1398
Flt Permitted	0.086				0.950	
Satd. Flow (perm)	162	4893	3375	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			13			147
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.86	0.88	0.92	0.80	0.88	0.76
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	103	1332	1571	140	112	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	1332	1711	0	112	163
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	110.0	94.0		30.0	30.0
Total Split (%)	11.4%	78.6%	67.1%		21.4%	21.4%
Maximum Green (s)	10.0	103.9	87.9		24.0	24.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	114.1	114.0	100.0		16.3	16.3
Actuated g/C Ratio	0.82	0.81	0.71		0.12	0.12
v/c Ratio	0.43	0.33	0.71		0.61	0.56
Control Delay	25.2	1.0	6.1		71.9	18.5
Queue Delay	0.0	0.0	0.1		0.0	0.0
Total Delay	25.2	1.0	6.3		71.9	18.5
LOS	C	A	A		E	B
Approach Delay		2.7	6.3		40.2	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 38 (27%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 7.5  
 Intersection LOS: A  
 Intersection Capacity Utilization 69.6%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1079	558	143	1428	3	400	1	149	88	11	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.999			0.854				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.963	
Satd. Flow (prot)	1805	4893	1599	1787	3403	0	3467	1607	0	1715	1622	1652
Flt Permitted	0.072			0.118			0.950			0.950	0.963	
Satd. Flow (perm)	137	4893	1599	222	3403	0	3467	1607	0	1715	1622	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			581		1			136				122
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.63	0.78	0.96	0.83	0.93	0.38	0.95	0.25	0.93	0.55	0.55	0.64
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	8	1383	581	172	1535	8	421	4	160	160	20	72
Shared Lane Traffic (%)										44%		
Lane Group Flow (vph)	8	1383	581	172	1543	0	421	164	0	90	90	72
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0





Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	662	0	0	1362	266	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.959	
Flt Protected					0.965	
Satd. Flow (prot)	3438	0	0	4893	3188	0
Flt Permitted					0.965	
Satd. Flow (perm)	3438	0	0	4893	3188	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					45	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.67	0.78
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	720	0	0	1497	397	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	720	0	0	1497	546	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	86.0			86.0	54.0	
Total Split (%)	61.4%			61.4%	38.6%	
Maximum Green (s)	80.2			80.2	48.0	
Yellow Time (s)	3.6			3.6	3.0	

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	102.0			102.6	29.0	
Actuated g/C Ratio	0.73			0.73	0.21	
v/c Ratio	0.29			0.42	0.78	
Control Delay	4.4			8.0	56.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	4.4			8.0	56.2	
LOS	A			A	E	
Approach Delay	4.4			8.0	56.2	
Approach LOS	A			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 75 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 16.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 45.4%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



# Lanes, Volumes, Timings

## 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1717	230	107	739	0	0	0	318	0	908	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		0	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.71	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850		0.850	
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			269									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		471			925		
Travel Time (s)		16.9			18.6		7.1			14.0		
Peak Hour Factor	0.92	0.85	0.77	0.76	0.77	0.92	0.92	0.92	0.89	0.92	0.82	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		24			24		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		95.0	20.0	25.0	78.0							42.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		67.9%	14.3%	17.9%	55.7%							30%
Maximum Green (s)		88.4	13.4	18.4	71.4							35.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		88.4	108.4	18.4	72.4			39.0			54.4	
Actuated g/C Ratio		0.63	0.77	0.13	0.52			0.28			0.39	
v/c Ratio		0.83	0.24	0.63	0.38			0.48			0.83	
Control Delay		19.2	1.3	64.1	14.9			44.7			44.9	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay		19.2	1.3	64.1	14.9			44.7			44.9	
LOS		B	A	E	B			D			D	
Approach Delay		16.9			21.2							
Approach LOS		B			C							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 26.2      Intersection LOS: C  
 Intersection Capacity Utilization Err%      ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	14%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings  
3: Howe Road & SR 82 Roylton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	1062	59	400	1227	48	116	32	846	39	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		800	570		250	300		0	110		0
Storage Lanes	2		1	2		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.75	0.86	0.94	0.91	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.982				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (prot)	3467	5337	0	4990	4940	1583	1665	1742	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (perm)	3467	5337	0	4990	4940	1583	1665	1742	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		27				79						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			665				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.78	0.87	0.36	0.81	0.86	0.80	0.85	0.50	0.92	0.81	0.38	0.46
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	36	1221	164	494	1427	60	136	64	920	48	8	24
Shared Lane Traffic (%)							28%					
Lane Group Flow (vph)	36	1385	0	494	1427	60	98	102	920	48	8	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			36			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	81	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	81	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	13.0	70.0		26.0	83.0	20.0	24.0	24.0		20.0	20.0	13.0



Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.3%	50.0%		18.6%	59.3%	14.3%	17.1%	17.1%		14.3%	14.3%	9.3%
Maximum Green (s)	7.0	63.4		20.0	76.4	13.4	17.4	17.4		13.4	13.4	7.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effct Green (s)	9.0	65.4		22.0	81.0	93.9	25.7	25.7	51.7	11.6	11.6	21.9
Actuated g/C Ratio	0.06	0.47		0.16	0.58	0.67	0.18	0.18	0.37	0.08	0.08	0.16
v/c Ratio	0.16	0.55		0.63	0.50	0.06	0.32	0.32	0.89	0.17	0.05	0.07
Control Delay	66.4	29.4		62.7	8.8	0.2	55.0	54.8	53.6	61.3	60.0	0.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.4	29.4		62.7	8.8	0.2	55.0	54.8	53.6	61.3	60.0	0.4
LOS	E	C		E	A	A	D	D	D	E	E	A
Approach Delay		30.4			21.9			53.8			42.9	
Approach LOS		C			C			D			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 32.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 72.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	1050	39	41	1166	60	4	1	11	59	3	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25		25			
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.994			0.988			0.910	0.850		0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4874	0	3467	4853	0	3467	1626	1519	1787	1693	0
Flt Permitted	0.133			0.950			0.950			0.950		
Satd. Flow (perm)	248	4874	0	3467	4853	0	3467	1626	1519	1787	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			14			6	122			16
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.75	0.95	0.81	0.79	0.81	0.47	0.50	0.25	0.69	0.70	0.38	0.63
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	28	1105	48	52	1440	128	8	4	16	84	8	16
Shared Lane Traffic (%)									39%			
Lane Group Flow (vph)	28	1153	0	52	1568	0	8	10	10	84	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	73.0		12.0	73.0		12.0	36.0	12.0	19.0		43.0

Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014

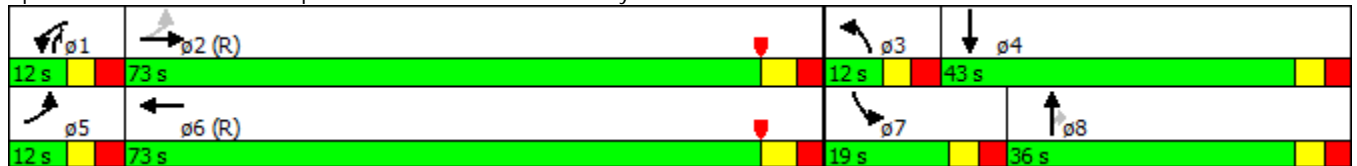


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	52.1%		8.6%	52.1%		8.6%	25.7%	8.6%	13.6%	30.7%	
Maximum Green (s)	6.0	66.4		6.0	66.4		6.0	30.0	6.0	13.0	37.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	111.1	104.1		9.2	107.6		7.8	11.8	12.4	12.6	13.4	
Actuated g/C Ratio	0.79	0.74		0.07	0.77		0.06	0.08	0.09	0.09	0.10	
v/c Ratio	0.10	0.32		0.23	0.42		0.04	0.07	0.04	0.52	0.14	
Control Delay	3.8	5.2		82.7	2.9		63.2	40.8	0.3	72.3	31.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	3.8	5.2		82.7	2.9		63.2	40.8	0.3	72.3	31.5	
LOS	A	A		F	A		E	D	A	E	C	
Approach Delay		5.2			5.4			32.7			63.2	
Approach LOS		A			A			C			E	

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	34 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle:	115
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.52
Intersection Signal Delay:	7.7
Intersection LOS:	A
Intersection Capacity Utilization:	50.2%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	54	1028	1082	67	47	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	4860	0	1593	1398
Flt Permitted	0.152				0.950	
Satd. Flow (perm)	286	4893	4860	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			13			56
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.61	0.92	0.80	0.80	0.84	0.71
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	89	1117	1352	84	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	1117	1436	0	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	108.0	92.0		32.0	32.0
Total Split (%)	11.4%	77.1%	65.7%		22.9%	22.9%
Maximum Green (s)	10.0	101.9	85.9		26.0	26.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	121.2	122.1	108.1		12.4	12.4
Actuated g/C Ratio	0.87	0.87	0.77		0.09	0.09
v/c Ratio	0.26	0.26	0.38		0.40	0.32
Control Delay	4.0	1.3	0.6		68.5	19.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	4.0	1.3	0.7		68.5	19.1
LOS	A	A	A		E	B
Approach Delay		1.5	0.7		43.8	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 46 (33%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.40  
 Intersection Signal Delay: 2.8  
 Intersection LOS: A  
 Intersection Capacity Utilization 48.5%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1040	106	51	1016	133	31	8	17	5	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.983			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1805	4893	1599	1787	4836	0	3467	1707	0	1715	1600	1652
Flt Permitted	0.160			0.222			0.950			0.950	0.950	
Satd. Flow (perm)	304	4893	1599	418	4836	0	3467	1707	0	1715	1600	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143		24			36				75
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.75	0.93	0.74	0.75	0.82	0.85	0.78	0.40	0.47	0.42	0.92	0.38
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	56	1118	143	68	1239	156	40	20	36	12	0	16
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	56	1118	143	68	1395	0	40	56	0	6	6	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	1665	0	0	1260	327	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.947	
Flt Protected					0.969	
Satd. Flow (prot)	3438	0	0	4893	3161	0
Flt Permitted					0.969	
Satd. Flow (perm)	3438	0	0	4893	3161	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					30	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.86	0.82
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	1810	0	0	1355	380	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1810	0	0	1355	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	100.0			100.0	40.0	
Total Split (%)	71.4%			71.4%	28.6%	
Maximum Green (s)	94.2			94.2	34.0	
Yellow Time (s)	3.6			3.6	3.0	



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014

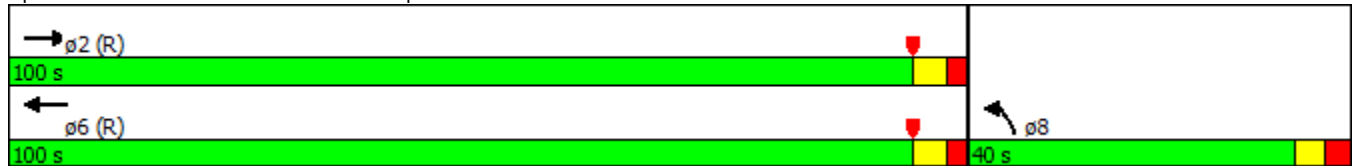


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	100.5			101.1	30.5	
Actuated g/C Ratio	0.72			0.72	0.22	
v/c Ratio	0.73			0.38	0.83	
Control Delay	12.7			8.2	59.6	
Queue Delay	0.0			0.0	0.0	
Total Delay	12.7			8.2	59.6	
LOS	B			A	E	
Approach Delay	12.7			8.2	59.6	
Approach LOS	B			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 108 (77%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 18.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1850	381	85	1188	0	0	0	701	0	1779	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		0	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850			0.850
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			350									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		669			1107		
Travel Time (s)		16.9			18.6		10.1			16.8		
Peak Hour Factor	0.92	0.87	0.87	0.46	0.86	0.92	0.92	0.92	0.90	0.92	0.96	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		24			24		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	Perm	Prot	NA				pt+ov		custom	
Protected Phases		6		5	2				4.5		1.4	1
Permitted Phases		6	6		2						1.4	
Detector Phase		6	6	5	2				4.5		1.4	
Switch Phase												
Minimum Initial (s)		25.0	25.0	10.0	25.0							1.0
Minimum Split (s)		32.0	32.0	17.0	32.0							20.0
Total Split (s)		83.0	83.0	28.0	53.0							58.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	29.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

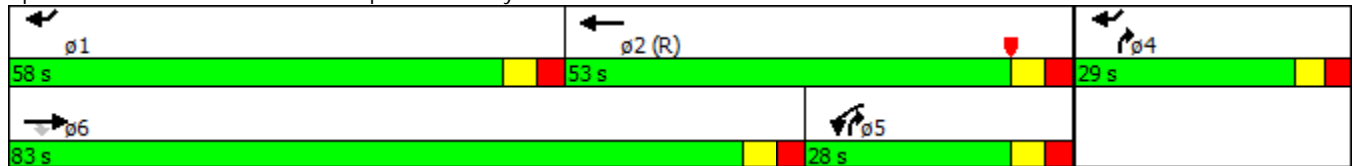


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		59.3%	59.3%	20.0%	37.9%							41%
Maximum Green (s)		76.4	76.4	21.4	46.4							51.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead	Lead	Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	5.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0	7.0		7.0							
Flash Dont Walk (s)		12.0	12.0		10.0							
Pedestrian Calls (#/hr)		0	0		0							
Act Effect Green (s)		76.4	76.4	21.4	46.4				51.0			80.4
Actuated g/C Ratio		0.55	0.55	0.15	0.33				0.36			0.57
v/c Ratio		0.79	0.44	0.71	0.85				0.81			0.94
Control Delay		16.0	2.4	61.4	39.6				47.7			38.0
Queue Delay		0.0	0.0	0.0	0.0				0.0			0.0
Total Delay		16.0	2.4	61.4	39.6				47.7			38.0
LOS		B	A	E	D				D			D
Approach Delay		13.7			42.2							
Approach LOS		B			D							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 60 (43%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 30.9  
 Intersection LOS: C  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15
























Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	21%
Maximum Green (s)	23.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings  
3: Howe Road & SR 82 Royalton Rd

4/25/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	1412	77	867	1779	321	170	102	597	222	140	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		800	570		250	300		0	110		0
Storage Lanes	2		1	2		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.86	0.86	0.94	0.91	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (prot)	3467	6155	0	4990	4940	1583	1665	1757	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (perm)	3467	6155	0	4990	4940	1583	1665	1757	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		14				178						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			667				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.88	0.82	0.53	0.80	0.95	0.69	0.92	0.88	0.90	0.80	0.83	0.69
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	217	1722	145	1084	1873	465	185	116	663	278	169	351
Shared Lane Traffic (%)							20%					
Lane Group Flow (vph)	217	1867	0	1084	1873	465	148	153	663	278	169	351
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			36			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	81	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	81	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	14.0	50.0		50.0	86.0	20.0	20.0	20.0		20.0	20.0	14.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014

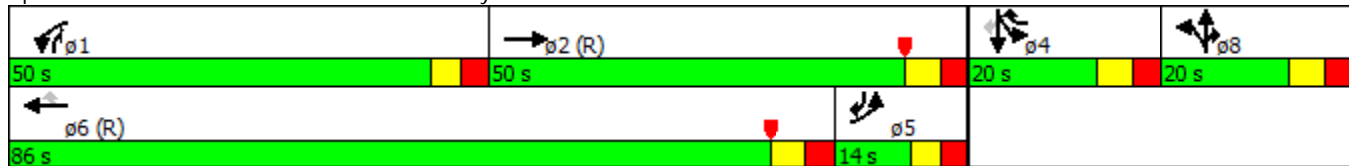


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	10.0%	35.7%		35.7%	61.4%	14.3%	14.3%	14.3%		14.3%	14.3%	10.0%
Maximum Green (s)	8.0	43.4		44.0	79.4	13.4	13.4	13.4		13.4	13.4	8.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effect Green (s)	10.0	50.3		41.1	81.4	96.8	15.0	15.0	60.1	15.0	15.0	29.6
Actuated g/C Ratio	0.07	0.36		0.29	0.58	0.69	0.11	0.11	0.43	0.11	0.11	0.21
v/c Ratio	0.88	0.84		0.74	0.65	0.40	0.83	0.81	0.55	0.76	0.84	0.80
Control Delay	80.8	31.5		47.4	19.8	4.9	95.6	91.9	31.3	74.6	93.8	48.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.8	31.5		47.4	19.8	4.9	95.6	91.9	31.3	74.6	93.8	48.1
LOS	F	C		D	B	A	F	F	C	E	F	D
Approach Delay		36.6			26.5			50.8			67.0	
Approach LOS		D			C			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 37.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 72.4%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖↖	↖↖↖		↖↖	↖	↖	↖	↖	↖
Volume (vph)	36	1227	52	328	1414	58	95	7	257	102	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.993			0.992			0.859	0.850			0.916
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4869	0	3467	4867	0	3467	1535	1519	1787	1723	0
Flt Permitted	0.135			0.950			0.950			0.950		
Satd. Flow (perm)	251	4869	0	3467	4867	0	3467	1535	1519	1787	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			8			148	122			36
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.60	0.85	0.76	0.90	0.95	0.69	0.77	0.77	0.85	0.77	0.64	0.86
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	60	1444	68	364	1488	84	123	9	302	132	28	36
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	60	1512	0	364	1572	0	123	157	154	132	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	58.0		24.0	70.0		13.0	36.0	24.0	22.0		45.0



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	41.4%		17.1%	50.0%		9.3%	25.7%	17.1%	15.7%	32.1%	
Maximum Green (s)	6.0	51.4		18.0	63.4		7.0	30.0	18.0	16.0	39.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	82.1	72.9		21.3	87.9		12.7	12.6	38.1	15.7	18.0	
Actuated g/C Ratio	0.59	0.52		0.15	0.63		0.09	0.09	0.27	0.11	0.13	
v/c Ratio	0.25	0.60		0.69	0.51		0.39	0.58	0.31	0.66	0.25	
Control Delay	9.5	17.0		76.9	7.0		66.4	19.3	11.4	75.5	28.7	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	9.5	17.2		76.9	7.0		66.4	19.3	11.4	75.5	28.7	
LOS	A	B		E	A		E	B	B	E	C	
Approach Delay		16.9			20.1			29.8			60.2	
Approach LOS		B			C			C			E	

Intersection Summary

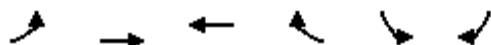
Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 19 (14%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 21.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 61.9%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↑↑		↘	↙
Volume (vph)	89	1172	1445	112	99	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	4850	0	1593	1398
Flt Permitted	0.104				0.950	
Satd. Flow (perm)	196	4893	4850	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			17			163
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.86	0.88	0.92	0.80	0.88	0.76
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	103	1332	1571	140	112	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	1332	1711	0	112	163
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	20.0	104.0	84.0		36.0	36.0
Total Split (%)	14.3%	74.3%	60.0%		25.7%	25.7%
Maximum Green (s)	14.0	97.9	77.9		30.0	30.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	114.1	114.0	100.4		16.3	16.3
Actuated g/C Ratio	0.82	0.81	0.72		0.12	0.12
v/c Ratio	0.39	0.33	0.49		0.61	0.53
Control Delay	15.7	0.7	4.5		71.7	14.1
Queue Delay	0.0	0.0	0.1		0.0	0.0
Total Delay	15.7	0.7	4.6		71.7	14.1
LOS	B	A	A		E	B
Approach Delay		1.7	4.6		37.6	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 52 (37%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 6.1  
 Intersection LOS: A  
 Intersection Capacity Utilization 56.5%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑	↗	↘↗	↗		↘	↗	↗
Volume (vph)	5	1079	558	143	1428	3	400	1	149	88	11	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850			0.850		0.854				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.963	
Satd. Flow (prot)	1805	4893	1599	1787	3406	1599	3467	1607	0	1715	1622	1652
Flt Permitted	0.075			0.121			0.950			0.950	0.963	
Satd. Flow (perm)	142	4893	1599	228	3406	1599	3467	1607	0	1715	1622	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			581			117		109				122
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.63	0.78	0.96	0.83	0.93	0.38	0.95	0.25	0.93	0.55	0.55	0.64
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	8	1383	581	172	1535	8	421	4	160	160	20	72
Shared Lane Traffic (%)										44%		
Lane Group Flow (vph)	8	1383	581	172	1535	8	421	164	0	90	90	72
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100	20	20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6		6						4
Detector Phase	5	2	8	1	6	6	8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0	30.0	10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6	45.6	33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	73.0	33.0	18.0	80.0	80.0	33.0	33.0		16.0	16.0	11.0
Total Split (%)	7.9%	52.1%	23.6%	12.9%	57.1%	57.1%	23.6%	23.6%		11.4%	11.4%	7.9%
Maximum Green (s)	5.0	66.4	27.0	12.0	73.4	73.4	27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6	3.6	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	0.0	-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6	6.6	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0	3.0	3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0	32.0	20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0	0	0	0				
Act Effect Green (s)	79.6	72.0	99.8	88.8	79.4	77.4	27.2	27.2		12.0	12.0	19.0
Actuated g/C Ratio	0.57	0.51	0.71	0.63	0.57	0.55	0.19	0.19		0.09	0.09	0.14
v/c Ratio	0.05	0.55	0.44	0.61	0.79	0.01	0.63	0.41		0.61	0.65	0.22
Control Delay	14.2	24.8	2.0	41.2	20.5	0.0	56.0	20.6		80.0	83.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	14.2	24.8	2.0	41.2	20.5	0.0	56.0	20.6		80.0	83.5	1.9
LOS	B	C	A	D	C	A	E	C		E	F	A
Approach Delay		18.0			22.5			46.0			58.9	
Approach LOS		B			C			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 13 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 25.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 77.2%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	662	0	0	1362	266	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.959	
Flt Protected					0.965	
Satd. Flow (prot)	3438	0	0	4893	3188	0
Flt Permitted					0.965	
Satd. Flow (perm)	3438	0	0	4893	3188	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					53	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.67	0.78
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	720	0	0	1497	397	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	720	0	0	1497	546	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	72.0			72.0	48.0	
Total Split (%)	60.0%			60.0%	40.0%	
Maximum Green (s)	66.2			66.2	42.0	
Yellow Time (s)	3.6			3.6	3.0	

Lanes, Volumes, Timings  
 1: I-71 NB Off Ramp

4/25/2014

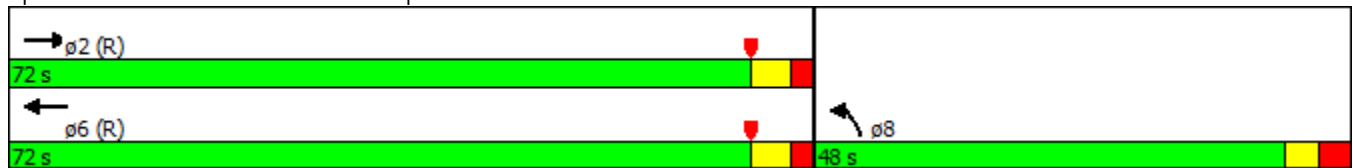


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	85.5			86.1	25.5	
Actuated g/C Ratio	0.71			0.72	0.21	
v/c Ratio	0.29			0.43	0.76	
Control Delay	3.6			7.8	46.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	3.6			7.8	46.9	
LOS	A			A	D	
Approach Delay	3.6			7.8	46.9	
Approach LOS	A			A	D	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 52 (43%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 14.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 45.4%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1717	230	107	739	0	0	0	318	0	908	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.71	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850		0.850	
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			235									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		471			925		
Travel Time (s)		16.9			18.6		7.1			14.0		
Peak Hour Factor	0.92	0.85	0.77	0.76	0.77	0.92	0.92	0.92	0.89	0.92	0.82	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		79.0	20.0	21.0	63.0							37.0



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		65.8%	16.7%	17.5%	52.5%							31%
Maximum Green (s)		72.4	13.4	14.4	56.4							30.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		72.4	92.4	14.4	57.7				35.0			49.1
Actuated g/C Ratio		0.60	0.77	0.12	0.48				0.29			0.41
v/c Ratio		0.87	0.24	0.69	0.41				0.46			0.79
Control Delay		19.9	0.7	61.1	14.9				37.1			35.6
Queue Delay		0.0	0.0	0.0	0.0				0.0			0.0
Total Delay		19.9	0.7	61.1	14.9				37.1			35.6
LOS		B	A	E	B				D			D
Approach Delay		17.4			20.8							
Approach LOS		B			C							

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 20 (17%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 23.7  
 Intersection LOS: C  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	17%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	

Lanes, Volumes, Timings  
3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑	↑↑		↑	↑↑↑		↑↑↑	↑
Volume (vph)	0	1062	87	0	1227	448	0	176	885	0	442	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	570		250	300		0	110		110
Storage Lanes	0		0	0		1	2		3	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.80	0.91	1.00	0.95	0.88	1.00	1.00	*0.61	1.00	0.86	0.86
Frt		0.975				0.850			0.850		0.996	0.850
Flt Protected												
Satd. Flow (prot)	0	4241	0	0	3438	2787	0	1881	2926	0	4834	1375
Flt Permitted												
Satd. Flow (perm)	0	4241	0	0	3438	2787	0	1881	2926	0	4834	1375
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		23				504					3	33
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		960			867			796			730	
Travel Time (s)		18.7			16.9			15.5			14.2	
Peak Hour Factor	0.78	0.87	0.36	0.81	0.86	0.80	0.85	0.50	0.92	0.81	0.38	0.46
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	0	1221	242	0	1427	560	0	352	962	0	1163	276
Shared Lane Traffic (%)												10%
Lane Group Flow (vph)	0	1463	0	0	1427	560	0	352	962	0	1191	248
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1			1	1		1	1		1	1
Detector Template		Thru			Thru	Right		Thru	Right		Thru	Right
Leading Detector (ft)		100			100	20		100	20		100	20
Trailing Detector (ft)		0			0	0		0	0		0	0
Detector 1 Position(ft)		0			0	0		0	0		0	0
Detector 1 Size(ft)		100			100	20		100	20		100	20
Detector 1 Type		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)		0.0			0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)		0.0			0.0	0.0		0.0	0.0		0.0	0.0
Turn Type		NA			NA	Perm		NA	Perm		NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases						6			8			4
Detector Phase		2			6	6		8	8		4	4
Switch Phase												
Minimum Initial (s)		27.0			27.0	27.0		10.0	10.0		10.0	10.0
Minimum Split (s)		40.6			46.6	46.6		20.0	20.0		41.6	41.6
Total Split (s)		66.0			66.0	66.0		54.0	54.0		54.0	54.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014

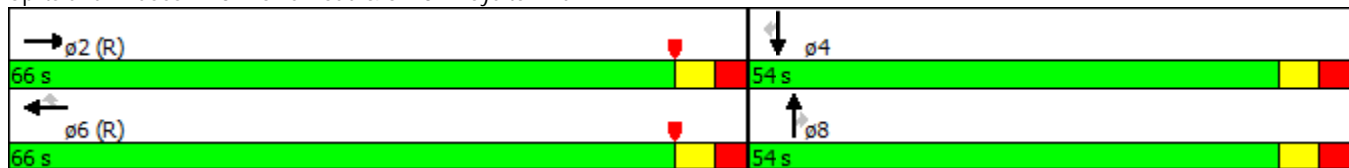


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	55.0%			55.0%		55.0%		45.0%	45.0%		45.0%	45.0%
Maximum Green (s)	59.4			59.4		59.4		47.4	47.4		47.4	47.4
Yellow Time (s)	3.6			3.6		3.6		3.6	3.6		3.6	3.6
All-Red Time (s)	3.0			3.0		3.0		3.0	3.0		3.0	3.0
Lost Time Adjust (s)	-2.0			-2.0		-2.0		-1.6	-1.6		-1.6	-1.6
Total Lost Time (s)	4.6			4.6		4.6		5.0	5.0		5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0			3.0		3.0		3.0	3.0		3.0	3.0
Recall Mode	C-Max			C-Max		C-Max		None	None		None	None
Walk Time (s)	9.0			10.0		10.0					9.0	9.0
Flash Dont Walk (s)	25.0			30.0		30.0					26.0	26.0
Pedestrian Calls (#/hr)	0			0		0					0	0
Act Effct Green (s)	63.7			63.7		63.7		46.7	46.7		46.7	46.7
Actuated g/C Ratio	0.53			0.53		0.53		0.39	0.39		0.39	0.39
v/c Ratio	0.65			0.78		0.33		0.48	0.85		0.63	0.45
Control Delay	23.1			18.1		1.4		29.7	41.2		31.1	25.7
Queue Delay	0.0			0.0		0.0		0.0	0.0		0.0	0.0
Total Delay	23.1			18.1		1.4		29.7	41.2		31.1	25.7
LOS	C			B		A		C	D		C	C
Approach Delay	23.1			13.4				38.1			30.2	
Approach LOS	C			B				D			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 24.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 51.4%  
 ICU Level of Service A  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	1050	39	41	1166	60	4	1	11	59	3	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25		25			
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	0.95	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.994			0.988			0.910	0.850		0.900	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4874	0	3467	3378	0	3467	1626	1519	1787	1693	0
Flt Permitted	0.116			0.950			0.950			0.950		
Satd. Flow (perm)	216	4874	0	3467	3378	0	3467	1626	1519	1787	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			10			6	87			16
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.75	0.95	0.81	0.79	0.81	0.47	0.50	0.25	0.69	0.70	0.38	0.63
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	28	1105	48	52	1440	128	8	4	16	84	8	16
Shared Lane Traffic (%)									39%			
Lane Group Flow (vph)	28	1153	0	52	1568	0	8	10	10	84	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	57.0		12.0	57.0		12.0	36.0	12.0	15.0		39.0

Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014

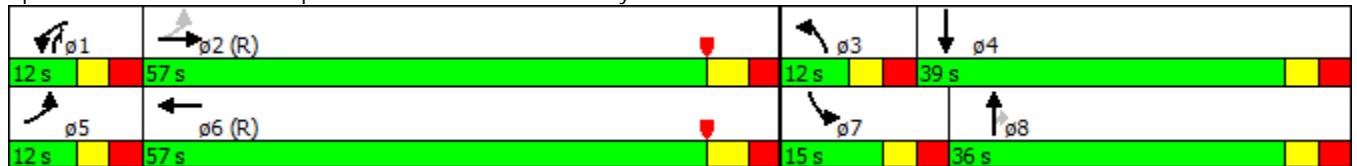


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	10.0%	47.5%		10.0%	47.5%		10.0%	30.0%	10.0%	12.5%	32.5%	
Maximum Green (s)	6.0	50.4		6.0	50.4		6.0	30.0	6.0	9.0	33.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	96.8	90.6		8.9	93.9		7.8	11.8	12.1	10.0	10.5	
Actuated g/C Ratio	0.81	0.76		0.07	0.78		0.06	0.10	0.10	0.08	0.09	
v/c Ratio	0.10	0.31		0.20	0.59		0.04	0.06	0.04	0.57	0.15	
Control Delay	2.0	3.7		52.0	3.7		53.0	35.0	0.3	68.2	29.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	2.0	3.7		52.0	3.7		53.0	35.0	0.3	68.2	29.0	
LOS	A	A		D	A		D	C	A	E	C	
Approach Delay		3.6			5.2			27.7			59.5	
Approach LOS		A			A			C			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 12 (10%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 6.8  
 Intersection LOS: A  
 Intersection Capacity Utilization 51.8%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014

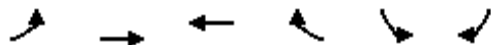


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↔		↘	↘
Volume (vph)	54	1028	1082	67	47	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	3382	0	1593	1398
Flt Permitted	0.138				0.950	
Satd. Flow (perm)	260	4893	3382	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			9			56
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.61	0.92	0.80	0.80	0.84	0.71
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	89	1117	1352	84	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	1117	1436	0	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0



Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014

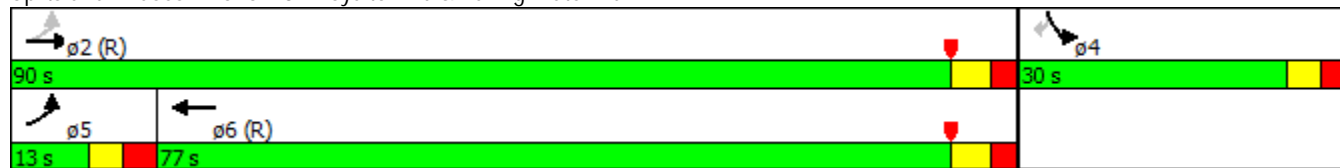


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	13.0	90.0	77.0		30.0	30.0
Total Split (%)	10.8%	75.0%	64.2%		25.0%	25.0%
Maximum Green (s)	7.0	83.9	70.9		24.0	24.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	101.7	102.5	88.5		11.9	11.9
Actuated g/C Ratio	0.85	0.85	0.74		0.10	0.10
v/c Ratio	0.27	0.27	0.58		0.35	0.30
Control Delay	7.7	1.4	3.2		56.6	16.9
Queue Delay	0.0	0.0	0.4		0.0	0.0
Total Delay	7.7	1.4	3.6		56.6	16.9
LOS	A	A	A		E	B
Approach Delay		1.9	3.6		36.8	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 39 (33%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.58  
 Intersection Signal Delay: 4.2  
 Intersection LOS: A  
 Intersection Capacity Utilization 58.1%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1040	106	51	1016	133	31	8	17	5	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.983			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1805	4893	1599	1787	3366	0	3467	1707	0	1715	1600	1652
Flt Permitted	0.134			0.218			0.950			0.950	0.950	
Satd. Flow (perm)	255	4893	1599	410	3366	0	3467	1707	0	1715	1600	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143		15			36				87
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.75	0.93	0.74	0.75	0.82	0.85	0.78	0.40	0.47	0.42	0.92	0.38
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	56	1118	143	68	1239	156	40	20	36	12	0	16
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	56	1118	143	68	1395	0	40	56	0	6	6	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014

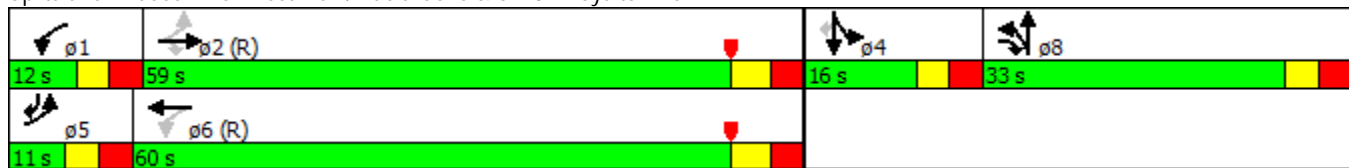


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	59.0	33.0	12.0	60.0		33.0	33.0		16.0	16.0	11.0
Total Split (%)	9.2%	49.2%	27.5%	10.0%	50.0%		27.5%	27.5%		13.3%	13.3%	9.2%
Maximum Green (s)	5.0	52.4	27.0	6.0	53.4		27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effect Green (s)	89.9	82.8	98.7	90.6	83.1		12.1	12.1		12.0	12.0	12.8
Actuated g/C Ratio	0.75	0.69	0.82	0.76	0.69		0.10	0.10		0.10	0.10	0.11
v/c Ratio	0.19	0.33	0.11	0.17	0.60		0.11	0.27		0.04	0.04	0.06
Control Delay	2.9	6.2	1.5	1.3	2.2		49.9	27.4		49.3	49.7	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	2.9	6.2	1.5	1.3	2.2		49.9	27.4		49.3	49.7	0.5
LOS	A	A	A	A	A		D	C		D	D	A
Approach Delay		5.5			2.2			36.8			21.5	
Approach LOS		A			A			D			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 35 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.60  
 Intersection Signal Delay: 5.0  
 Intersection LOS: A  
 Intersection Capacity Utilization 55.3%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings  
101: Howe Road

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	15	1	13	9	3	58	82	1158	3	67	12	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.870			0.900			0.999				0.943
Flt Protected	0.950	0.995			0.992			0.995				0.993
Satd. Flow (prot)	1588	1439	0	0	1663	0	0	3518	0	0	0	3314
Flt Permitted	0.950	0.995			0.992			0.995				0.993
Satd. Flow (perm)	1588	1439	0	0	1663	0	0	3518	0	0	0	3314
Link Speed (mph)		30			30			35				35
Link Distance (ft)		279			279			702				796
Travel Time (s)		6.3			6.3			13.7				15.5
Peak Hour Factor	0.65	0.92	0.69	0.40	0.25	0.59	0.55	0.88	0.50	0.92	0.63	0.70
Heavy Vehicles (%)	8%	2%	9%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	23	1	19	23	12	98	149	1316	6	73	19	321
Shared Lane Traffic (%)	10%											
Lane Group Flow (vph)	21	22	0	0	132	0	0	1471	0	0	0	666
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Sign Control		Yield			Yield			Yield				Yield

Intersection Summary

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	69.7%
Analysis Period (min)	15
	ICU Level of Service C

Lanes, Volumes, Timings  
 101: Howe Road

4/25/2014

Lane Group	SBR
Lane Configurations	
Volume (vph)	182
Ideal Flow (vphpl)	1900
Lane Util. Factor	0.95
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.72
Heavy Vehicles (%)	2%
Adj. Flow (vph)	253
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Sign Control	
Intersection Summary	

Lanes, Volumes, Timings  
102: Howe Road

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕			↕		↔		↕			↕
Volume (vph)	0	0	0	12	0	0	516	7	66	5	0	51
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	0.95	0.95
Frt									0.993			
Flt Protected					0.950		0.950		0.964			
Satd. Flow (prot)	0	1863	0	0	1770	0	1681	0	1694	0	0	3539
Flt Permitted					0.950		0.950		0.964			
Satd. Flow (perm)	0	1863	0	0	1770	0	1681	0	1694	0	0	3539
Link Speed (mph)		30			30				35			35
Link Distance (ft)		270			285				730			375
Travel Time (s)		6.1			6.5				14.2			7.3
Peak Hour Factor	0.92	0.92	0.92	0.42	0.92	0.92	0.92	0.50	0.98	0.33	0.92	0.70
Adj. Flow (vph)	0	0	0	29	0	0	561	14	67	15	0	73
Shared Lane Traffic (%)							42%					
Lane Group Flow (vph)	0	0	0	0	29	0	325	0	332	0	0	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(ft)		0			0				24			24
Link Offset(ft)		0			0				0			0
Crosswalk Width(ft)		16			16				16			16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	15	
Sign Control		Yield			Yield				Yield			Yield

Intersection Summary

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	33.0%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings  
102: Howe Road

4/25/2014

Lane Group	SBR
Lane Configurations	
Volume (vph)	0
Ideal Flow (vphpl)	1900
Lane Util. Factor	0.95
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Adj. Flow (vph)	0
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Sign Control	
Intersection Summary	

# Lanes, Volumes, Timings

## 1: I-71 NB Off Ramp

4/25/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	1665	0	0	1260	327	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.947	
Flt Protected					0.969	
Satd. Flow (prot)	3438	0	0	4893	3161	0
Flt Permitted					0.969	
Satd. Flow (perm)	3438	0	0	4893	3161	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					30	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.86	0.82
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	1810	0	0	1355	380	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1810	0	0	1355	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	93.0			93.0	37.0	
Total Split (%)	71.5%			71.5%	28.5%	
Maximum Green (s)	87.2			87.2	31.0	
Yellow Time (s)	3.6			3.6	3.0	



Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

4/25/2014

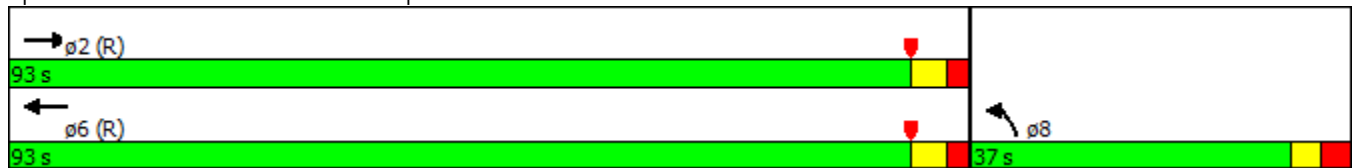


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	92.5			93.1	28.5	
Actuated g/C Ratio	0.71			0.72	0.22	
v/c Ratio	0.74			0.39	0.82	
Control Delay	12.1			7.9	55.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	12.1			7.9	55.7	
LOS	B			A	E	
Approach Delay	12.1			7.9	55.7	
Approach LOS	B			A	E	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 115 (88%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 17.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



# Lanes, Volumes, Timings

## 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1850	381	85	1188	0	0	0	701	0	1779	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Fr <sub>t</sub>			0.850						0.850			0.850
Fl <sub>t</sub> Protected				0.950								
Satd. Flow (prot)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Fl <sub>t</sub> Permitted				0.950								
Satd. Flow (perm)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			234									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		669			1107		
Travel Time (s)		16.9			18.6		10.1			16.8		
Peak Hour Factor	0.92	0.87	0.87	0.46	0.86	0.92	0.92	0.92	0.90	0.92	0.96	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		75.0	28.0	27.0	49.0							53.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	28.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

4/25/2014

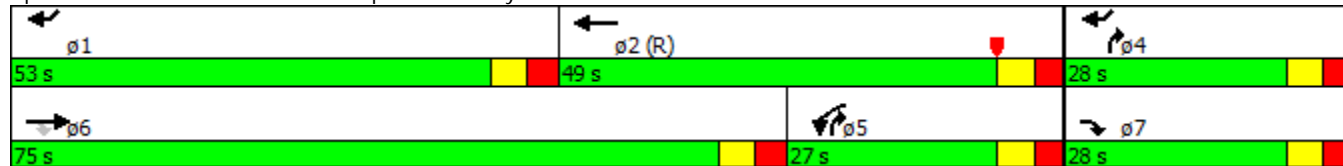


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		57.7%	21.5%	20.8%	37.7%							41%
Maximum Green (s)		68.4	21.4	20.4	42.4							46.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		68.4	96.4	20.4	42.4			48.4			74.4	
Actuated g/C Ratio		0.53	0.74	0.16	0.33			0.37			0.57	
v/c Ratio		0.82	0.36	0.69	0.87			0.79			0.94	
Control Delay		23.5	1.9	56.2	38.4			43.2			36.7	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.5	
Total Delay		23.5	1.9	56.2	38.4			43.2			37.2	
LOS		C	A	E	D			D			D	
Approach Delay		19.8			40.5							
Approach LOS		B			D							

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	73 (56%), Referenced to phase 2:WBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	32.1
Intersection LOS:	C
Intersection Capacity Utilization Err%	ICU Level of Service H
Analysis Period (min)	15

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	22%
Maximum Green (s)	21.4
Yellow Time (s)	3.6
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings  
3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑	↑↑		↑	↑↑↑		↑↑↑	↑
Volume (vph)	0	1412	268	0	1779	1188	0	463	819	0	1229	412
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	570		250	300		0	110		110
Storage Lanes	0		0	0		2	2		3	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.88	1.00	1.00	0.76	1.00	0.86	0.86
Frt		0.966				0.850			0.850		0.988	0.850
Flt Protected												
Satd. Flow (prot)	0	4782	0	0	4940	2787	0	1881	3646	0	4795	1375
Flt Permitted												
Satd. Flow (perm)	0	4782	0	0	4940	2787	0	1881	3646	0	4795	1375
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		2				247					11	30
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		960			867			794			733	
Travel Time (s)		18.7			16.9			15.5			14.3	
Peak Hour Factor	0.88	0.82	0.53	0.80	0.95	0.69	0.92	0.88	0.90	0.80	0.83	0.69
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	0	1722	506	0	1873	1722	0	526	910	0	1481	597
Shared Lane Traffic (%)												22%
Lane Group Flow (vph)	0	2228	0	0	1873	1722	0	526	910	0	1612	466
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		1			1	1		1	1		1	1
Detector Template		Thru			Thru	Right		Thru	Right		Thru	Right
Leading Detector (ft)		100			100	20		100	20		100	20
Trailing Detector (ft)		0			0	0		0	0		0	0
Detector 1 Position(ft)		0			0	0		0	0		0	0
Detector 1 Size(ft)		100			100	20		100	20		100	20
Detector 1 Type		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)		0.0			0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)		0.0			0.0	0.0		0.0	0.0		0.0	0.0
Turn Type		NA			NA	Perm		NA	Perm		NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases						6			8			4
Detector Phase		2			6	6		8	8		4	4
Switch Phase												
Minimum Initial (s)		27.0			27.0	27.0		10.0	10.0		10.0	10.0
Minimum Split (s)		40.6			46.6	46.6		20.0	20.0		20.0	20.0
Total Split (s)		81.0			81.0	81.0		49.0	49.0		49.0	49.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)		62.3%			62.3%	62.3%		37.7%	37.7%		37.7%	37.7%
Maximum Green (s)		74.4			74.4	74.4		42.4	42.4		42.4	42.4
Yellow Time (s)		3.6			3.6	3.6		3.6	3.6		3.6	3.6
All-Red Time (s)		3.0			3.0	3.0		3.0	3.0		3.0	3.0
Lost Time Adjust (s)		-2.0			-2.0	-2.0		-1.6	-1.6		-1.6	-1.6
Total Lost Time (s)		4.6			4.6	4.6		5.0	5.0		5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	3.0
Recall Mode		C-Max			C-Max	C-Max		None	None		None	None
Walk Time (s)		9.0			10.0	10.0						
Flash Dont Walk (s)		25.0			30.0	30.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)		76.4			76.4	76.4		44.0	44.0		44.0	44.0
Actuated g/C Ratio		0.59			0.59	0.59		0.34	0.34		0.34	0.34
v/c Ratio		0.79			0.65	0.99		0.83	0.74		0.99	0.96
Control Delay		15.0			18.5	36.5		52.0	42.3		62.3	72.1
Queue Delay		0.0			0.0	0.2		0.0	0.0		0.0	0.0
Total Delay		15.0			18.5	36.7		52.0	42.3		62.3	72.1
LOS		B			B	D		D	D		E	E
Approach Delay		15.0			27.2			45.8			64.5	
Approach LOS		B			C			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.99  
 Intersection Signal Delay: 35.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 73.9%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



Lanes, Volumes, Timings

4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	1227	52	328	1414	58	95	7	257	102	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.993				0.850		0.859	0.850		0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4869	0	3467	3406	1599	3467	1535	1519	1787	1723	0
Flt Permitted	0.121			0.950			0.950			0.950		
Satd. Flow (perm)	225	4869	0	3467	3406	1599	3467	1535	1519	1787	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				126		148	81		36	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		564			960			408			362	
Travel Time (s)		11.0			18.7			11.1			9.9	
Peak Hour Factor	0.60	0.85	0.76	0.90	0.95	0.69	0.77	0.77	0.85	0.77	0.64	0.86
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	60	1444	68	364	1488	84	123	9	302	132	28	36
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	60	1512	0	364	1488	84	123	157	154	132	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA		Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2					6			8			
Detector Phase	5	2		1	6	6	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0	35.0	6.0	10.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	48.6		12.0	41.6	41.6	12.0	36.0	12.0	12.0	39.0	
Total Split (s)	12.0	57.0		21.0	66.0	66.0	13.0	36.0	21.0	16.0	39.0	



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

4/25/2014

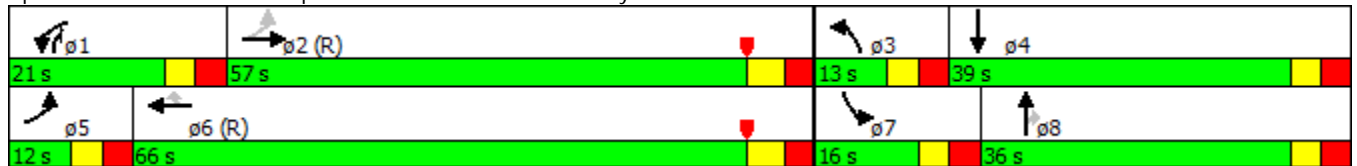


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	43.8%		16.2%	50.8%	50.8%	10.0%	27.7%	16.2%	12.3%	30.0%	
Maximum Green (s)	6.0	50.4		15.0	59.4	59.4	7.0	30.0	15.0	10.0	33.0	
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	0.0	-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6	6.6	4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0	2.0	3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		8.0			7.0	7.0		7.0			9.0	
Flash Dont Walk (s)		34.0			24.0	24.0		23.0			24.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effct Green (s)	77.2	68.1		20.6	82.5	80.5	12.6	12.5	37.3	11.3	13.6	
Actuated g/C Ratio	0.59	0.52		0.16	0.63	0.62	0.10	0.10	0.29	0.09	0.10	
v/c Ratio	0.26	0.59		0.66	0.69	0.08	0.37	0.56	0.31	0.85	0.30	
Control Delay	8.4	13.0		64.4	10.9	0.1	60.7	18.0	18.0	99.8	30.4	
Queue Delay	0.0	0.2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.4	13.2		64.4	10.9	0.1	60.7	18.0	18.0	99.8	30.4	
LOS	A	B		E	B	A	E	B	B	F	C	
Approach Delay		13.0			20.5			30.1			77.2	
Approach LOS		B			C			C			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 21.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 67.5%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	89	1172	1445	112	99	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	3375	0	1593	1398
Flt Permitted	0.082				0.950	
Satd. Flow (perm)	154	4893	3375	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			13			143
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.86	0.88	0.92	0.80	0.88	0.76
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	103	1332	1571	140	112	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	1332	1711	0	112	163
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

# Lanes, Volumes, Timings

## 5: SR 82 Royalton Rd & Falling Water Rd

4/25/2014

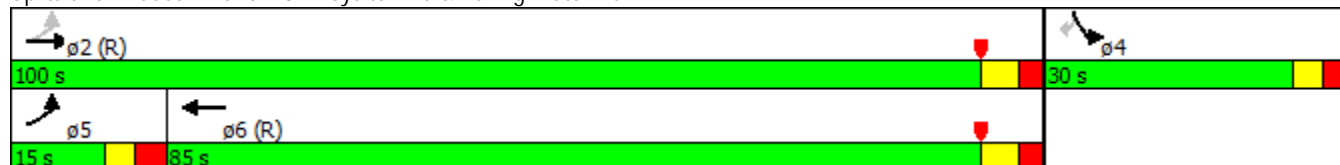


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	15.0	100.0	85.0		30.0	30.0
Total Split (%)	11.5%	76.9%	65.4%		23.1%	23.1%
Maximum Green (s)	9.0	93.9	78.9		24.0	24.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	104.7	104.6	90.4		15.7	15.7
Actuated g/C Ratio	0.81	0.80	0.70		0.12	0.12
v/c Ratio	0.42	0.34	0.73		0.58	0.55
Control Delay	28.2	2.9	5.5		65.8	18.5
Queue Delay	0.0	0.0	0.1		0.0	0.0
Total Delay	28.2	2.9	5.6		65.8	18.5
LOS	C	A	A		E	B
Approach Delay		4.7	5.6		37.8	
Approach LOS		A	A		D	

### Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 8 (6%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 7.8  
 Intersection LOS: A  
 Intersection Capacity Utilization 69.6%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



Lanes, Volumes, Timings  
6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑		↗↘	↗		↘	↗	↗
Volume (vph)	5	1079	558	143	1428	3	400	1	149	88	11	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.999			0.854				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.963	
Satd. Flow (prot)	1805	4893	1599	1787	3403	0	3467	1607	0	1715	1622	1652
Flt Permitted	0.064			0.112			0.950			0.950	0.963	
Satd. Flow (perm)	122	4893	1599	211	3403	0	3467	1607	0	1715	1622	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			581		1			132				131
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.63	0.78	0.96	0.83	0.93	0.38	0.95	0.25	0.93	0.55	0.55	0.64
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	8	1383	581	172	1535	8	421	4	160	160	20	72
Shared Lane Traffic (%)										44%		
Lane Group Flow (vph)	8	1383	581	172	1543	0	421	164	0	90	90	72
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	62.0	33.0	19.0	70.0		33.0	33.0		16.0	16.0	11.0
Total Split (%)	8.5%	47.7%	25.4%	14.6%	53.8%		25.4%	25.4%		12.3%	12.3%	8.5%
Maximum Green (s)	5.0	55.4	27.0	13.0	63.4		27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effect Green (s)	69.9	62.3	89.5	79.4	70.0		26.6	26.6		12.0	12.0	19.0
Actuated g/C Ratio	0.54	0.48	0.69	0.61	0.54		0.20	0.20		0.09	0.09	0.15
v/c Ratio	0.05	0.59	0.45	0.61	0.84		0.59	0.38		0.57	0.60	0.20
Control Delay	9.2	15.4	1.8	35.1	20.8		50.2	13.6		71.3	74.3	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.6		0.0	0.0		0.0	0.0	0.0
Total Delay	9.2	15.4	1.8	35.1	21.4		50.2	13.6		71.3	74.3	1.3
LOS	A	B	A	D	C		D	B		E	E	A
Approach Delay		11.4			22.8			39.9			52.4	
Approach LOS		B			C			D			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 120 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 21.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 77.3%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 101: Howe Road & Mall Entrance/Bridal Trail

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	236	17	115	4	7	28	85	837	9	413	58	821
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.896			0.920			0.998				
Flt Protected	0.950	0.991			0.991			0.995				0.981
Satd. Flow (prot)	1681	1571	0	0	1698	0	0	3514	0	0	0	3472
Flt Permitted	0.950	0.991			0.991			0.995				0.981
Satd. Flow (perm)	1681	1571	0	0	1698	0	0	3514	0	0	0	3472
Link Speed (mph)		30			30			35				35
Link Distance (ft)		410			457			662				794
Travel Time (s)		9.3			10.4			12.9				15.5
Peak Hour Factor	0.81	0.63	0.72	0.38	0.50	0.78	0.86	0.90	0.67	0.92	0.72	0.94
Adj. Flow (vph)	291	27	160	11	14	36	99	930	13	449	81	873
Shared Lane Traffic (%)	15%											
Lane Group Flow (vph)	247	231	0	0	61	0	0	1042	0	0	0	1403
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Sign Control		Yield			Yield			Yield				Yield

Intersection Summary

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	89.4%
ICU Level of Service	E
Analysis Period (min)	15

Lanes, Volumes, Timings  
 101: Howe Road & Mall Entrance/Bridal Trail

4/25/2014

Lane Group	SBR
Lane Configurations	
Volume (vph)	336
Ideal Flow (vphpl)	1900
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Adj. Flow (vph)	365
Shared Lane Traffic (%)	
Lane Group Flow (vph)	365
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Sign Control	
<b>Intersection Summary</b>	

Lanes, Volumes, Timings  
102: Howe Road

4/25/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕			↕		↕		↕			↕
Volume (vph)	2	8	37	136	13	9	1037	58	336	112	9	317
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	0.95	0.95
Frt		0.907			0.989				0.978			0.995
Flt Protected		0.994			0.962		0.950		0.976			0.998
Satd. Flow (prot)	0	1679	0	0	1772	0	1681	0	1689	0	0	3514
Flt Permitted		0.994			0.962		0.950		0.976			0.998
Satd. Flow (perm)	0	1679	0	0	1772	0	1681	0	1689	0	0	3514
Link Speed (mph)		30			30				35			35
Link Distance (ft)		462			400				733			382
Travel Time (s)		10.5			9.1				14.3			7.4
Peak Hour Factor	0.25	0.58	0.75	0.78	0.50	0.50	0.80	0.68	0.98	0.83	0.67	0.92
Adj. Flow (vph)	8	14	49	174	26	18	1296	85	343	135	13	345
Shared Lane Traffic (%)							28%					
Lane Group Flow (vph)	0	71	0	0	218	0	933	0	926	0	0	371
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(ft)		0			0				24			24
Link Offset(ft)		0			0				0			0
Crosswalk Width(ft)		16			16				16			16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	15	
Sign Control		Yield			Yield				Yield			Yield

Intersection Summary

Area Type:	Other
Control Type:	Roundabout
Intersection Capacity Utilization	77.3%
ICU Level of Service	D
Analysis Period (min)	15



Lanes, Volumes, Timings  
 102: Howe Road

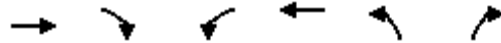
4/25/2014



Lane Group	SBR
Lane Configurations	
Volume (vph)	9
Ideal Flow (vphpl)	1900
Lane Util. Factor	0.95
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.67
Adj. Flow (vph)	13
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Sign Control	
Intersection Summary	

# Lanes, Volumes, Timings

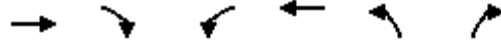
## 1: I-71 NB Off Ramp



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	662	0	0	1362	266	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.959	
Flt Protected					0.965	
Satd. Flow (prot)	3438	0	0	4893	3188	0
Flt Permitted					0.965	
Satd. Flow (perm)	3438	0	0	4893	3188	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					45	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.67	0.78
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	720	0	0	1497	397	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	720	0	0	1497	546	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	86.0			86.0	54.0	
Total Split (%)	61.4%			61.4%	38.6%	
Maximum Green (s)	80.2			80.2	48.0	
Yellow Time (s)	3.6			3.6	3.0	

# Lanes, Volumes, Timings

## 1: I-71 NB Off Ramp

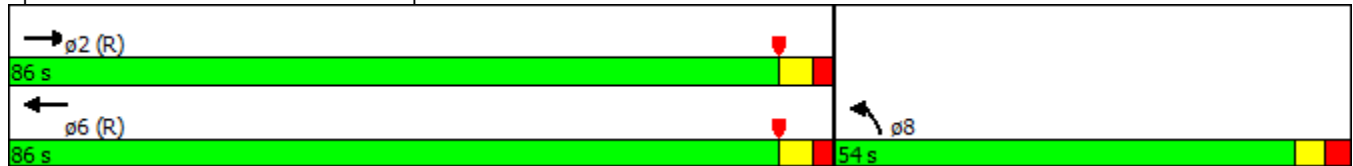


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	102.0			102.6	29.0	
Actuated g/C Ratio	0.73			0.73	0.21	
v/c Ratio	0.29			0.42	0.78	
Control Delay	3.5			8.0	56.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	3.5			8.0	56.2	
LOS	A			A	E	
Approach Delay	3.5			8.0	56.2	
Approach LOS	A			A	E	

### Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	74 (53%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.78
Intersection Signal Delay:	16.4
Intersection LOS:	B
Intersection Capacity Utilization	45.4%
ICU Level of Service	A
Analysis Period (min)	15

### Splits and Phases: 1: I-71 NB Off Ramp



## Lanes, Volumes, Timings

### 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1717	230	107	739	0	0	0	318	0	908	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.55	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Frt			0.850						0.850		0.850	
Flt Protected				0.950								
Satd. Flow (prot)	0	1990	1538	1703	4893	0	0	0	2656	0	3441	
Flt Permitted				0.950								
Satd. Flow (perm)	0	1990	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			87									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		471			925		
Travel Time (s)		16.9			18.6		7.1			14.0		
Peak Hour Factor	0.92	0.85	0.77	0.76	0.77	0.92	0.92	0.92	0.89	0.92	0.82	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		103.0	20.0	17.0	76.0							44.0

## Lanes, Volumes, Timings

### 2: I-71 SB Ramp & SR 82 Royalton Rd

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Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		73.6%	14.3%	12.1%	54.3%							31%
Maximum Green (s)		96.4	13.4	10.4	69.4							37.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		96.4	116.4	10.4	71.1			31.0			55.7	
Actuated g/C Ratio		0.69	0.83	0.07	0.51			0.22			0.40	
v/c Ratio		1.47	0.23	1.12	0.39			0.61			0.81	
Control Delay		235.2	1.9	165.5	15.4			54.1			42.7	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay		235.2	1.9	165.5	15.4			54.1			42.7	
LOS		F	A	F	B			D			D	
Approach Delay		205.1			34.7							
Approach LOS		F			C							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 37 (26%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.47  
 Intersection Signal Delay: 118.8  
 Intersection LOS: F  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd


































## Lanes, Volumes, Timings

### 2: I-71 SB Ramp & SR 82 Royalton Rd

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Lane Group	ø4
Total Split (%)	14%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  				 	 		
Volume (vph)	28	1062	59	400	1227	48	116	32	846	39	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	570		250	300		0	110		0
Storage Lanes	2		0	1		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.50	0.91	0.97	0.91	1.00	0.95	0.95	*0.61	0.97	1.00	1.00
Frt		0.982				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (prot)	3467	2668	0	3433	4940	1583	1665	1742	1951	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (perm)	3467	2668	0	3433	4940	1583	1665	1742	1951	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		11				79						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			665				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.78	0.87	0.36	0.81	0.86	0.80	0.85	0.50	0.92	0.81	0.38	0.46
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	36	1221	164	494	1427	60	136	64	920	48	8	24
Shared Lane Traffic (%)							28%					
Lane Group Flow (vph)	36	1385	0	494	1427	60	98	102	920	48	8	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	8 1	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	8 1	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	24.0	73.0		24.0	73.0	19.0	24.0	24.0		19.0	19.0	24.0





# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖↖	↖↖↖		↖↖	↖	↖	↖	↖	↖
Volume (vph)	21	1050	39	41	1166	60	4	1	11	59	3	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.994			0.988			0.910	0.850			0.900
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4874	0	3467	4853	0	3467	1626	1519	1787	1693	0
Flt Permitted	0.133			0.950			0.950			0.950		
Satd. Flow (perm)	248	4874	0	3467	4853	0	3467	1626	1519	1787	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			14			6	122			16
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.75	0.95	0.81	0.79	0.81	0.47	0.50	0.25	0.69	0.70	0.38	0.63
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	28	1105	48	52	1440	128	8	4	16	84	8	16
Shared Lane Traffic (%)									39%			
Lane Group Flow (vph)	28	1153	0	52	1568	0	8	10	10	84	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	73.0		12.0	73.0		12.0	36.0	12.0	19.0		43.0

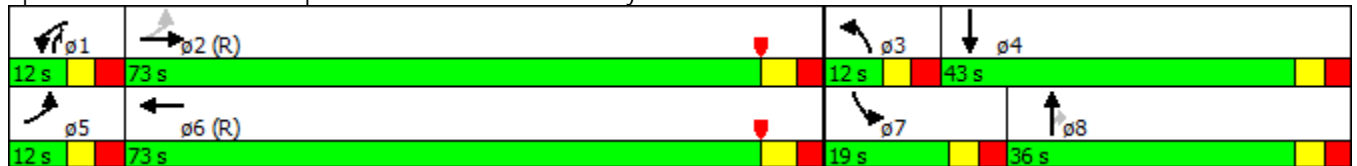
Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

	↖		→		↘		↙		←		↖		↗		↑		↘		↓		↙	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR										
Total Split (%)	8.6%	52.1%		8.6%	52.1%		8.6%	25.7%	8.6%	13.6%	30.7%											
Maximum Green (s)	6.0	66.4		6.0	66.4		6.0	30.0	6.0	13.0	37.0											
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0											
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0											
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3											
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7											
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag											
Lead-Lag Optimize?																						
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0											
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None											
Walk Time (s)		8.0			7.0			7.0			9.0											
Flash Dont Walk (s)		34.0			24.0			23.0			24.0											
Pedestrian Calls (#/hr)		0			0			0			0											
Act Effct Green (s)	111.1	104.1		9.2	107.6		7.8	11.8	12.4	12.6	13.4											
Actuated g/C Ratio	0.79	0.74		0.07	0.77		0.06	0.08	0.09	0.09	0.10											
v/c Ratio	0.10	0.32		0.23	0.42		0.04	0.07	0.04	0.52	0.14											
Control Delay	4.0	5.5		86.9	1.9		63.2	40.8	0.3	72.3	31.5											
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0											
Total Delay	4.0	5.5		86.9	1.9		63.2	40.8	0.3	72.3	31.5											
LOS	A	A		F	A		E	D	A	E	C											
Approach Delay		5.4			4.6			32.7			63.2											
Approach LOS		A			A			C			E											

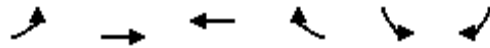
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 38 (27%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.52  
 Intersection Signal Delay: 7.4  
 Intersection Capacity Utilization 50.2%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



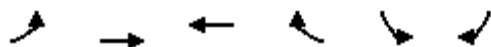
Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↑↑↔		↘	↙
Volume (vph)	54	1028	1082	67	47	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	4860	0	1593	1398
Flt Permitted	0.152				0.950	
Satd. Flow (perm)	286	4893	4860	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			11			56
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.61	0.92	0.80	0.80	0.84	0.71
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	89	1117	1352	84	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	1117	1436	0	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

# Lanes, Volumes, Timings

## 5: SR 82 Royalton Rd & Falling Water Rd

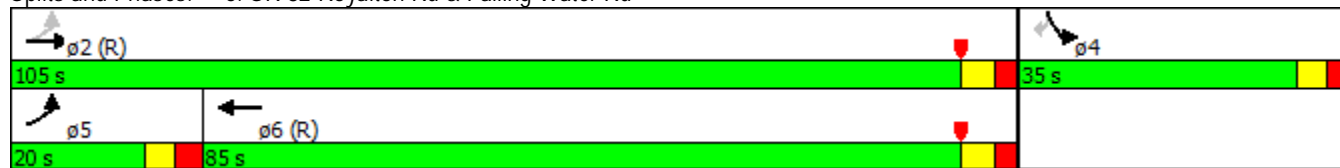


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	20.0	105.0	85.0		35.0	35.0
Total Split (%)	14.3%	75.0%	60.7%		25.0%	25.0%
Maximum Green (s)	14.0	98.9	78.9		29.0	29.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effect Green (s)	121.2	122.1	108.1		12.4	12.4
Actuated g/C Ratio	0.87	0.87	0.77		0.09	0.09
v/c Ratio	0.26	0.26	0.38		0.40	0.32
Control Delay	2.9	0.3	0.8		68.4	19.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	2.9	0.3	0.9		68.4	19.0
LOS	A	A	A		E	B
Approach Delay		0.5	0.9		43.7	
Approach LOS		A	A		D	

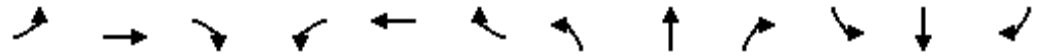
### Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 55 (39%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.40  
 Intersection Signal Delay: 2.5  
 Intersection LOS: A  
 Intersection Capacity Utilization 48.5%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd

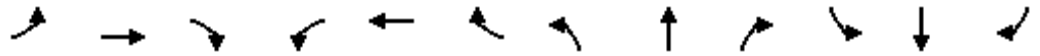


Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1040	106	51	1016	133	31	8	17	5	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		400	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.983			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1805	4893	1599	1787	4836	0	3467	1707	0	1715	1600	1652
Flt Permitted	0.160			0.222			0.950			0.950	0.950	
Satd. Flow (perm)	304	4893	1599	418	4836	0	3467	1707	0	1715	1600	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143		23			36				75
Link Speed (mph)		35			35			25				25
Link Distance (ft)		508			654			362				400
Travel Time (s)		9.9			12.7			9.9				10.9
Peak Hour Factor	0.75	0.93	0.74	0.75	0.82	0.85	0.78	0.40	0.47	0.42	0.92	0.38
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	56	1118	143	68	1239	156	40	20	36	12	0	16
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	56	1118	143	68	1395	0	40	56	0	6	6	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	13.0	75.0	35.0	14.0	76.0		35.0	35.0		16.0	16.0	13.0
Total Split (%)	9.3%	53.6%	25.0%	10.0%	54.3%		25.0%	25.0%		11.4%	11.4%	9.3%
Maximum Green (s)	7.0	68.4	29.0	8.0	69.4		29.0	29.0		10.0	10.0	7.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effct Green (s)	109.8	102.7	118.7	110.6	103.0		12.2	12.2		12.0	12.0	12.7
Actuated g/C Ratio	0.78	0.73	0.85	0.79	0.74		0.09	0.09		0.09	0.09	0.09
v/c Ratio	0.17	0.31	0.10	0.16	0.39		0.13	0.31		0.04	0.04	0.07
Control Delay	4.7	6.6	0.9	2.1	2.3		60.0	31.9		59.7	59.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	4.7	6.6	0.9	2.1	2.3		60.0	31.9		59.7	59.7	0.7
LOS	A	A	A	A	A		E	C		E	E	A
Approach Delay		5.9			2.3			43.6			26.0	
Approach LOS		A			A			D			C	

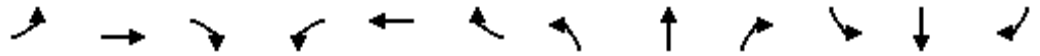
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 39 (28%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.39  
 Intersection Signal Delay: 5.5  
 Intersection LOS: A  
 Intersection Capacity Utilization 48.8%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 7: Ordner Dr & SR 82 Royalton Rd



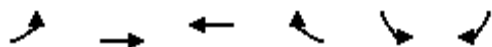
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1059	3	35	861	43	6	5	98	51	6	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Storage Length (ft)	80		0	118		0	0		0	30		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.993			0.884				0.900
Flt Protected	0.950			0.950				0.996		0.950		
Satd. Flow (prot)	1805	3431	0	1770	3389	0	0	1597	0	1787	1699	0
Flt Permitted	0.245			0.202				0.974		0.341		
Satd. Flow (perm)	466	3431	0	376	3389	0	0	1562	0	641	1699	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			7			124				24
Link Speed (mph)		35			35			25				25
Link Distance (ft)		436			419			369				222
Travel Time (s)		8.5			8.2			10.1				6.1
Peak Hour Factor	0.25	0.92	0.25	0.88	0.83	0.83	0.50	0.63	0.79	0.80	0.50	0.54
Heavy Vehicles (%)	0%	5%	5%	2%	6%	1%	4%	1%	1%	1%	0%	1%
Adj. Flow (vph)	4	1151	12	40	1037	52	12	8	124	64	12	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	1163	0	40	1089	0	0	144	0	64	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	100		20	100		20	100		20	100	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4		4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	12.0	25.7		12.0	35.7		31.0	31.0		21.1	21.1	





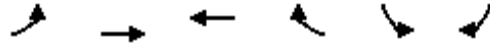
## Lanes, Volumes, Timings

### 8: SR 82 Royalton Rd & Mall Drive (Target)



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	81	1029	827	53	34	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325			240	100	100
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.88
Fr <sub>t</sub>				0.850		0.850
Fl <sub>t</sub> Protected	0.950				0.950	
Satd. Flow (prot)	1787	3406	3374	1599	3467	2814
Fl <sub>t</sub> Permitted	0.259				0.950	
Satd. Flow (perm)	487	3406	3374	1599	3467	2814
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				72		56
Link Speed (mph)		35	35		25	
Link Distance (ft)		832	436		432	
Travel Time (s)		16.2	8.5		11.8	
Peak Hour Factor	0.84	0.91	0.84	0.74	0.61	0.57
Heavy Vehicles (%)	1%	6%	7%	1%	1%	1%
Adj. Flow (vph)	96	1131	985	72	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	96	1131	985	72	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	100	100	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		3	
Permitted Phases	6			2		3
Detector Phase	1	6	2	2	3	3
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0	25.0	10.0	10.0
Minimum Split (s)	13.0	31.5	39.3	39.3	35.0	35.0
Total Split (s)	19.0	105.0	86.0	86.0	35.0	35.0

Lanes, Volumes, Timings  
 8: SR 82 Royalton Rd & Mall Drive (Target)



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (%)	13.6%	75.0%	61.4%	61.4%	25.0%	25.0%
Maximum Green (s)	13.0	98.7	79.7	79.7	29.1	29.1
Yellow Time (s)	3.0	3.6	3.6	3.6	3.0	3.0
All-Red Time (s)	3.0	2.7	2.7	2.7	2.9	2.9
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.0	-1.0
Total Lost Time (s)	4.3	4.6	4.6	4.6	4.9	4.9
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Walk Time (s)			10.0	10.0	6.0	6.0
Flash Dont Walk (s)			23.0	23.0	18.0	18.0
Pedestrian Calls (#/hr)			0	0	0	0
Act Effct Green (s)	123.0	123.6	109.7	109.7	11.0	11.0
Actuated g/C Ratio	0.88	0.88	0.78	0.78	0.08	0.08
v/c Ratio	0.19	0.38	0.37	0.06	0.21	0.21
Control Delay	2.0	1.7	5.4	1.2	62.4	16.6
Queue Delay	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	2.0	1.7	5.5	1.2	62.4	16.6
LOS	A	A	A	A	E	B
Approach Delay		1.7	5.2		39.5	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 28 (20%), Referenced to phase 2:WBT and 6:EBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.38  
 Intersection Signal Delay: 5.0  
 Intersection Capacity Utilization 48.5%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 8: SR 82 Royalton Rd & Mall Drive (Target)



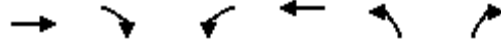
# Lanes, Volumes, Timings

## 9: Pearlview & SR 82 Royalton Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	ø4	ø6
Lane Configurations	↑↑		↙	↑↑↑	↘			
Volume (vph)	1105	4	5	895	3	15		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Storage Length (ft)		0	40		0	0		
Storage Lanes		0	1		1	0		
Taper Length (ft)			25		25			
Lane Util. Factor	0.95	0.95	1.00	0.91	1.00	1.00		
Frt	0.999				0.905			
Flt Protected			0.950		0.985			
Satd. Flow (prot)	3435	0	1770	4940	1667	0		
Flt Permitted			0.145		0.985			
Satd. Flow (perm)	3435	0	270	4940	1667	0		
Right Turn on Red		Yes				Yes		
Satd. Flow (RTOR)	1				19			
Link Speed (mph)	35			35	25			
Link Distance (ft)	828			161	466			
Travel Time (s)	16.1			3.1	12.7			
Peak Hour Factor	0.97	0.50	0.63	0.84	0.38	0.80		
Heavy Vehicles (%)	5%	2%	2%	5%	3%	1%		
Adj. Flow (vph)	1139	8	8	1065	8	19		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	1147	0	8	1065	27	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	12			12	12			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Turning Speed (mph)		9	15		15	9		
Number of Detectors	1		1	1	1			
Detector Template	Thru		Left	Thru	Left			
Leading Detector (ft)	100		20	100	20			
Trailing Detector (ft)	0		0	0	0			
Detector 1 Position(ft)	0		0	0	0			
Detector 1 Size(ft)	100		20	100	20			
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel								
Detector 1 Extend (s)	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0		0.0	0.0	0.0			
Turn Type	NA		custom	NA	Prot			
Protected Phases	2		1	1 4 6	3		4	6
Permitted Phases			6					
Detector Phase	2		1	1 4 6	3			
Switch Phase								
Minimum Initial (s)	18.0		7.0		10.0		10.0	18.0
Minimum Split (s)	24.6		13.3		31.1		16.0	24.6
Total Split (s)	74.8		17.0		31.2		17.0	91.8

Lanes, Volumes, Timings  
 9: Pearlview & SR 82 Royalton Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	ø4	ø6
Total Split (%)	53.4%		12.1%		22.3%		12%	66%
Maximum Green (s)	68.2		11.0		25.2		11.0	85.2
Yellow Time (s)	3.6		3.0		3.0		3.0	3.6
All-Red Time (s)	3.0		3.0		3.0		3.0	3.0
Lost Time Adjust (s)	0.0		0.0		0.0			
Total Lost Time (s)	6.6		6.0		6.0			
Lead/Lag	Lag		Lead		Lead		Lag	
Lead-Lag Optimize?								
Vehicle Extension (s)	3.6		3.0		3.0		3.0	3.6
Recall Mode	C-Max		None		None		None	C-Max
Walk Time (s)	7.0				7.0		7.0	
Flash Dont Walk (s)	10.0				17.0		10.0	
Pedestrian Calls (#/hr)	0				0		0	
Act Effct Green (s)	73.5		90.9	113.6	14.4			
Actuated g/C Ratio	0.52		0.65	0.81	0.10			
v/c Ratio	0.64		0.03	0.27	0.14			
Control Delay	26.5		2.4	0.9	29.3			
Queue Delay	0.0		0.0	0.2	0.0			
Total Delay	26.5		2.4	1.0	29.3			
LOS	C		A		A		C	
Approach Delay	26.5				1.0		29.3	
Approach LOS	C				A		C	

Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	24 (17%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle:	95
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	14.4
Intersection LOS:	B
Intersection Capacity Utilization	49.5%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 9: Pearlview & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 27: Howe Road

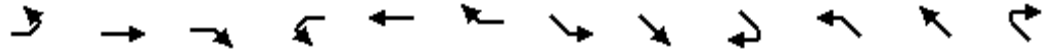


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑↑	↑↑	
Volume (vph)	0	0	0	994	412	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt					0.984	
Flt Protected						
Satd. Flow (prot)	0	0	0	3539	3483	0
Flt Permitted						
Satd. Flow (perm)	0	0	0	3539	3483	0
Link Speed (mph)	30			35	35	
Link Distance (ft)	256			396	665	
Travel Time (s)	5.8			7.7	13.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1080	448	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	1080	502	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			24	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

### Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	30.8%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings  
 29: SR 82 Royalton Rd & I-71 NB On Ramp

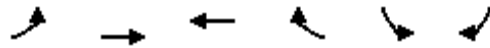


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑↑	↑		↑↑↑							
Volume (vph)	0	662	1373	0	846	782	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.928							
Flt Protected												
Satd. Flow (prot)	0	3438	1538	0	4541	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	3438	1538	0	4541	0	0	0	0	0	0	0
Link Speed (mph)		35			30			45			30	
Link Distance (ft)		953			266			386			430	
Travel Time (s)		18.6			6.0			5.8			9.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%	2%	6%	6%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	720	1492	0	930	850	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	720	1492	0	1780	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	88.3%
Analysis Period (min)	15
	ICU Level of Service E

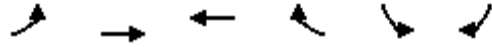
Lanes, Volumes, Timings  
 99: SR 82 Royalton Rd & Police Drive



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø1	ø2	ø3
Lane Configurations		↑↑	↑↑	↗	↘				
Volume (vph)	0	1120	850	9	25	50			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	0			75	0	0			
Storage Lanes	0			1	1	0			
Taper Length (ft)	25				25				
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00			
Frt				0.850	0.910				
Flt Protected					0.984				
Satd. Flow (prot)	0	3438	3438	1583	1668	0			
Flt Permitted					0.984				
Satd. Flow (perm)	0	3438	3438	1583	1668	0			
Right Turn on Red				Yes		Yes			
Satd. Flow (RTOR)				5	54				
Link Speed (mph)		35	35		30				
Link Distance (ft)		161	832		289				
Travel Time (s)		3.1	16.2		6.6				
Peak Hour Factor	0.92	0.97	0.84	0.92	0.92	0.92			
Heavy Vehicles (%)	2%	5%	5%	2%	2%	2%			
Adj. Flow (vph)	0	1155	1012	10	27	54			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	1155	1012	10	81	0			
Enter Blocked Intersection	No	No	No	No	No	No			
Lane Alignment	Left	Left	Left	Right	Left	Right			
Median Width(ft)		12	12		12				
Link Offset(ft)		0	0		0				
Crosswalk Width(ft)		16	16		16				
Two way Left Turn Lane									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Turning Speed (mph)	15			9	15	9			
Number of Detectors		2	2	1	1				
Detector Template		Thru	Thru	Right	Left				
Leading Detector (ft)		100	100	20	20				
Trailing Detector (ft)		0	0	0	0				
Detector 1 Position(ft)		0	0	0	0				
Detector 1 Size(ft)		6	6	20	20				
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				
Detector 1 Channel									
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				
Detector 2 Position(ft)		94	94						
Detector 2 Size(ft)		6	6						
Detector 2 Type		Cl+Ex	Cl+Ex						
Detector 2 Channel									
Detector 2 Extend (s)		0.0	0.0						
Turn Type		NA	NA	Perm	Prot				
Protected Phases		2 3	6		4		1	2	3
Permitted Phases				6					



Lanes, Volumes, Timings  
 99: SR 82 Royalton Rd & Police Drive



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø1	ø2	ø3
Detector Phase		2 3	6	6	4				
Switch Phase									
Minimum Initial (s)			18.0	18.0	10.0		7.0	18.0	10.0
Minimum Split (s)			24.6	24.6	16.0		13.3	24.6	31.1
Total Split (s)			91.8	91.8	17.0		17.0	74.8	31.2
Total Split (%)			65.6%	65.6%	12.1%		12%	53%	22%
Maximum Green (s)			85.2	85.2	11.0		11.0	68.2	25.2
Yellow Time (s)			3.6	3.6	3.0		3.0	3.6	3.0
All-Red Time (s)			3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0				
Total Lost Time (s)			6.6	6.6	6.0				
Lead/Lag					Lag		Lead	Lag	Lead
Lead-Lag Optimize?									
Vehicle Extension (s)			3.6	3.6	3.0		3.0	3.6	3.0
Recall Mode			C-Max	C-Max	None		None	C-Max	None
Walk Time (s)			7.0	7.0				7.0	7.0
Flash Dont Walk (s)			10.0	10.0				10.0	17.0
Pedestrian Calls (#/hr)			0	0				0	0
Act Effect Green (s)		94.0	90.3	90.3	16.7				
Actuated g/C Ratio		0.67	0.64	0.64	0.12				
v/c Ratio		0.50	0.46	0.01	0.33				
Control Delay		0.7	10.0	6.3	26.3				
Queue Delay		0.1	0.0	0.0	0.0				
Total Delay		0.8	10.0	6.3	26.3				
LOS		A	B	A	C				
Approach Delay		0.8	10.0		26.3				
Approach LOS		A	A		C				

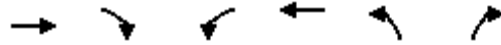
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 24 (17%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.64  
 Intersection Signal Delay: 5.9  
 Intersection LOS: A  
 Intersection Capacity Utilization 49.8%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 99: SR 82 Royalton Rd & Police Drive



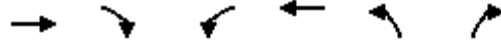
Lanes, Volumes, Timings  
1: I-71 NB Off Ramp



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	1665	0	0	1260	327	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.947	
Flt Protected					0.969	
Satd. Flow (prot)	3438	0	0	4893	3161	0
Flt Permitted					0.969	
Satd. Flow (perm)	3438	0	0	4893	3161	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					30	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.86	0.82
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	1810	0	0	1355	380	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1810	0	0	1355	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	100.0			100.0	40.0	
Total Split (%)	71.4%			71.4%	28.6%	
Maximum Green (s)	94.2			94.2	34.0	
Yellow Time (s)	3.6			3.6	3.0	

# Lanes, Volumes, Timings

## 1: I-71 NB Off Ramp

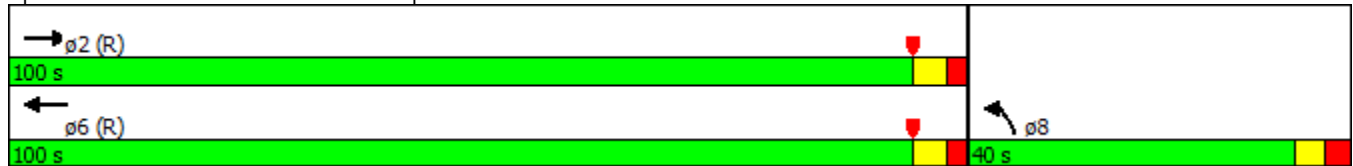


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	100.5			101.1	30.5	
Actuated g/C Ratio	0.72			0.72	0.22	
v/c Ratio	0.73			0.38	0.83	
Control Delay	7.8			8.2	59.6	
Queue Delay	0.0			0.0	0.0	
Total Delay	7.8			8.2	59.6	
LOS	A			A	E	
Approach Delay	7.8			8.2	59.6	
Approach LOS	A			A	E	

### Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 113 (81%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 16.0  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

### Splits and Phases: 1: I-71 NB Off Ramp



## Lanes, Volumes, Timings

### 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1850	381	85	1188	0	0	0	701	0	1779	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		1	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.50	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Frt			0.850						0.850		0.850	
Flt Protected				0.950								
Satd. Flow (prot)	0	2714	1538	1703	4893	0	0	0	2656	0	3441	
Flt Permitted				0.950								
Satd. Flow (perm)	0	2714	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			438									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		669			1107		
Travel Time (s)		16.9			18.6		10.1			16.8		
Peak Hour Factor	0.92	0.87	0.87	0.46	0.86	0.92	0.92	0.92	0.90	0.92	0.96	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		12			12		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	Perm	Prot	NA				pt+ov		custom	
Protected Phases		6		5	2				4 5		1 4	1
Permitted Phases		6	6		2						1 4	
Detector Phase		6	6	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	25.0	10.0	25.0							1.0
Minimum Split (s)		32.0	32.0	17.0	32.0							20.0
Total Split (s)		99.0	99.0	19.0	55.0							63.0

## Lanes, Volumes, Timings

### 2: I-71 SB Ramp & SR 82 Royalton Rd

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Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	22.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

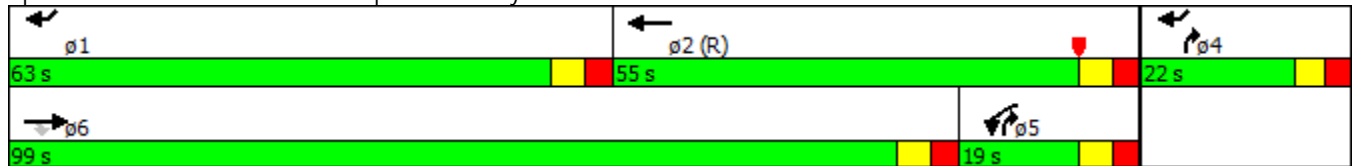


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		70.7%	70.7%	13.6%	39.3%							45%
Maximum Green (s)		92.4	92.4	12.4	48.4							56.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead	Lead	Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	5.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0	7.0		7.0							
Flash Dont Walk (s)		12.0	12.0		10.0							
Pedestrian Calls (#/hr)		0	0		0							
Act Effect Green (s)		92.4	92.4	12.4	48.4			35.0			78.4	
Actuated g/C Ratio		0.66	0.66	0.09	0.35			0.25			0.56	
v/c Ratio		1.19	0.38	1.23	0.82			1.17			0.96	
Control Delay		105.5	0.3	192.2	36.8			138.9			43.0	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay		105.5	0.3	192.2	36.8			138.9			43.0	
LOS		F	A	F	D			F			D	
Approach Delay		87.6			55.2							
Approach LOS		F			E							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 67 (48%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.23  
 Intersection Signal Delay: 73.8  
 Intersection LOS: E  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



## Lanes, Volumes, Timings

































### 2: I-71 SB Ramp & SR 82 Royalton Rd

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Lane Group	ø4
Total Split (%)	16%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	

### Lanes, Volumes, Timings

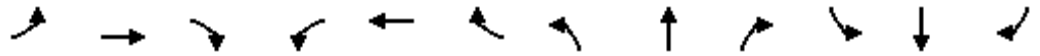
#### 3: Howe Road & SR 82 Roylton Rd

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  				 	 		 
Volume (vph)	191	1412	77	867	1779	321	170	102	597	222	140	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	570		250	300		0	110		0
Storage Lanes	2		0	1		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.70	0.91	0.97	0.91	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (prot)	3467	3757	0	3433	4940	1583	1665	1757	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (perm)	3467	3757	0	3433	4940	1583	1665	1757	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		8				209						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			667				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.88	0.82	0.53	0.80	0.95	0.69	0.92	0.88	0.90	0.80	0.83	0.69
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	217	1722	145	1084	1873	465	185	116	663	278	169	351
Shared Lane Traffic (%)							20%					
Lane Group Flow (vph)	217	1867	0	1084	1873	465	148	153	663	278	169	351
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	8 1	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	8 1	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	20.0	54.0		45.0	79.0	19.0	22.0	22.0		19.0	19.0	20.0



### Lanes, Volumes, Timings

#### 3: Howe Road & SR 82 Royalton Rd

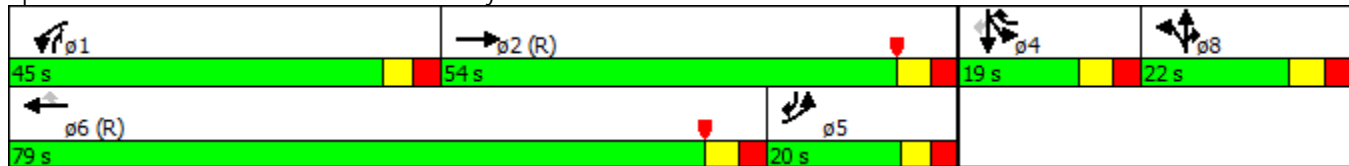


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	14.3%	38.6%		32.1%	56.4%	13.6%	15.7%	15.7%		13.6%	13.6%	14.3%
Maximum Green (s)	14.0	47.4		39.0	72.4	12.4	15.4	15.4		12.4	12.4	14.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effct Green (s)	16.0	49.4		41.0	74.4	88.8	17.0	17.0	62.0	14.0	14.0	34.6
Actuated g/C Ratio	0.11	0.35		0.29	0.53	0.63	0.12	0.12	0.44	0.10	0.10	0.25
v/c Ratio	0.55	1.40		1.08	0.71	0.43	0.73	0.72	0.53	0.81	0.90	0.72
Control Delay	50.7	214.3		93.1	25.4	5.8	80.6	78.4	30.4	80.2	105.4	39.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.7	214.3		93.1	25.4	5.8	80.6	78.4	30.4	80.2	105.4	39.6
LOS	D	F		F	C	A	F	E	C	F	F	D
Approach Delay		197.3			44.2			45.7			67.7	
Approach LOS		F			D			D			E	

#### Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.40  
 Intersection Signal Delay: 90.8      Intersection LOS: F  
 Intersection Capacity Utilization 85.9%      ICU Level of Service E  
 Analysis Period (min) 15  
 \* User Entered Value

#### Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



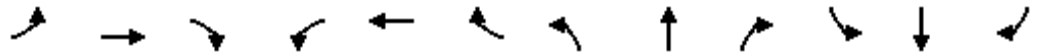
# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	1227	52	328	1414	58	95	7	257	102	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.993			0.992			0.859	0.850			0.916
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4869	0	3467	4867	0	3467	1535	1519	1787	1723	0
Flt Permitted	0.139			0.950			0.950			0.950		
Satd. Flow (perm)	259	4869	0	3467	4867	0	3467	1535	1519	1787	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			9			148	75			36
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.60	0.85	0.76	0.90	0.95	0.69	0.77	0.77	0.85	0.77	0.64	0.86
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	60	1444	68	364	1488	84	123	9	302	132	28	36
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	60	1512	0	364	1572	0	123	157	154	132	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	61.0		25.0	74.0		13.0	36.0	25.0	18.0		41.0

Lanes, Volumes, Timings  
**4: Southpark Mall East Drive & SR 82 Royalton Rd**



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	43.6%		17.9%	52.9%		9.3%	25.7%	17.9%	12.9%	29.3%	
Maximum Green (s)	6.0	54.4		19.0	67.4		7.0	30.0	19.0	12.0	35.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	84.6	75.4		21.4	90.6		12.8	12.6	38.2	13.1	15.3	
Actuated g/C Ratio	0.60	0.54		0.15	0.65		0.09	0.09	0.27	0.09	0.11	
v/c Ratio	0.24	0.58		0.69	0.50		0.39	0.58	0.33	0.79	0.29	
Control Delay	8.1	14.8		81.9	5.6		66.2	19.3	21.4	92.9	31.4	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	8.1	15.0		81.9	5.6		66.2	19.3	21.4	92.9	31.4	
LOS	A	B		F	A		E	B	C	F	C	
Approach Delay		14.7			19.9			33.3			72.8	
Approach LOS		B			B			C			E	

**Intersection Summary**

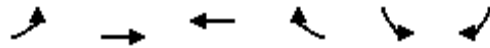
Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 25 (18%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 21.9  
 Intersection Capacity Utilization 61.9%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service B

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



# Lanes, Volumes, Timings

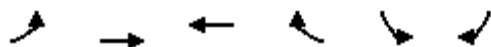
## 5: SR 82 Royalton Rd & Falling Water Rd



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	89	1172	1445	112	99	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	4850	0	1593	1398
Flt Permitted	0.104				0.950	
Satd. Flow (perm)	196	4893	4850	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			20			147
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.86	0.88	0.92	0.80	0.88	0.76
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	103	1332	1571	140	112	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	1332	1711	0	112	163
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

# Lanes, Volumes, Timings

## 5: SR 82 Royalton Rd & Falling Water Rd

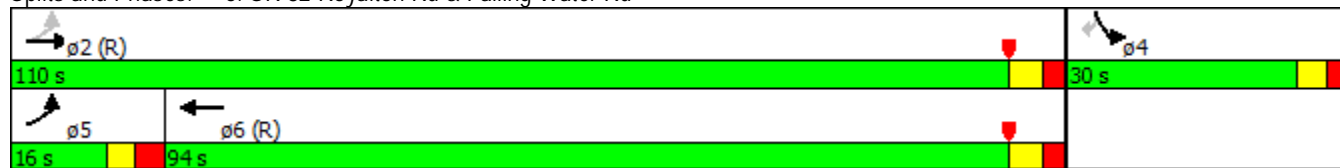


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	110.0	94.0		30.0	30.0
Total Split (%)	11.4%	78.6%	67.1%		21.4%	21.4%
Maximum Green (s)	10.0	103.9	87.9		24.0	24.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	114.1	114.0	100.7		16.3	16.3
Actuated g/C Ratio	0.82	0.81	0.72		0.12	0.12
v/c Ratio	0.40	0.33	0.49		0.61	0.56
Control Delay	16.5	1.3	3.5		71.9	18.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	16.5	1.3	3.6		71.9	18.5
LOS	B	A	A		E	B
Approach Delay		2.4	3.6		40.2	
Approach LOS		A	A		D	

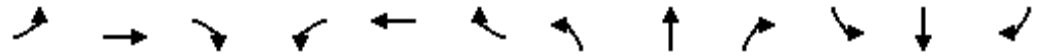
### Intersection Summary

Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	38 (27%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.61
Intersection Signal Delay:	6.0
Intersection LOS:	A
Intersection Capacity Utilization	56.5%
ICU Level of Service	B
Analysis Period (min)	15

### Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



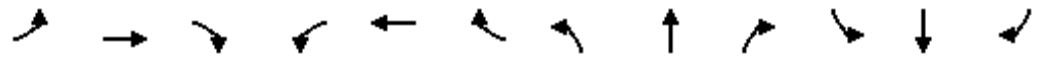
Lanes, Volumes, Timings  
 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑		↖↗	↗		↖	↖	↗
Volume (vph)	5	1079	558	143	1428	3	400	1	149	88	11	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		400	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.999			0.854				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.963	
Satd. Flow (prot)	1805	4893	1599	1787	4890	0	3467	1607	0	1715	1622	1652
Flt Permitted	0.117			0.121			0.950			0.950	0.963	
Satd. Flow (perm)	222	4893	1599	228	4890	0	3467	1607	0	1715	1622	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			581		1			109				122
Link Speed (mph)		35			35			25				25
Link Distance (ft)		549			654			362				400
Travel Time (s)		10.7			12.7			9.9				10.9
Peak Hour Factor	0.63	0.78	0.96	0.83	0.93	0.38	0.95	0.25	0.93	0.55	0.55	0.64
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	8	1383	581	172	1535	8	421	4	160	160	20	72
Shared Lane Traffic (%)										44%		
Lane Group Flow (vph)	8	1383	581	172	1543	0	421	164	0	90	90	72
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0



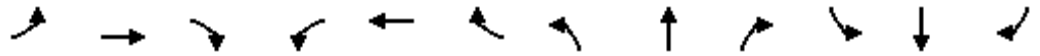
Lanes, Volumes, Timings  
7: Ordner Dr & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	1380	25	142	1652	81	9	13	99	43	10	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Storage Length (ft)	80		0	118		0	0		0	30		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.993			0.898				0.933
Flt Protected	0.950			0.950				0.995		0.950		
Satd. Flow (prot)	1805	3428	0	1770	3390	0	0	1620	0	1787	1765	0
Flt Permitted	0.087			0.111				0.963		0.336		
Satd. Flow (perm)	165	3428	0	207	3390	0	0	1567	0	632	1765	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			8			97			16	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		436			378			369			222	
Travel Time (s)		8.5			7.4			10.1			6.1	
Peak Hour Factor	0.38	0.91	0.89	0.89	0.92	0.88	0.56	0.65	0.90	0.77	0.50	0.56
Heavy Vehicles (%)	0%	5%	5%	2%	6%	1%	4%	1%	1%	1%	0%	1%
Adj. Flow (vph)	8	1516	28	160	1796	92	16	20	110	56	20	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1544	0	160	1888	0	0	146	0	56	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	100		20	100		20	100		20	100	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	12.0	25.7		12.0	35.7		31.0	31.0		21.1	21.1	



Lanes, Volumes, Timings  
 7: Ordner Dr & SR 82 Royalton Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	12.0	88.0		21.0	97.0		31.0	31.0		31.0	31.0	
Total Split (%)	8.6%	62.9%		15.0%	69.3%		22.1%	22.1%		22.1%	22.1%	
Maximum Green (s)	6.0	82.3		15.0	91.3		25.0	25.0		25.0	25.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	2.1		3.0	2.1		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-1.6	-1.6		-1.6	-1.6			-1.1		-1.1	-1.1	
Total Lost Time (s)	4.4	4.1		4.4	4.1		4.9			4.9	4.9	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			12.0		6.0	6.0				
Flash Dont Walk (s)		10.0			18.0		19.0	19.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effect Green (s)	106.2	98.9		115.3	113.2			15.4		15.4	15.4	
Actuated g/C Ratio	0.76	0.71		0.82	0.81		0.11			0.11	0.11	
v/c Ratio	0.04	0.64		0.52	0.69		0.57			0.81	0.17	
Control Delay	1.7	6.0		18.7	3.4		29.8			123.9	36.7	
Queue Delay	0.0	0.1		0.0	0.0		0.0			0.0	0.0	
Total Delay	1.7	6.1		18.7	3.4		29.8			123.9	36.7	
LOS	A	A		B	A		C			F	D	
Approach Delay		6.1			4.6		29.8				89.8	
Approach LOS		A			A		C				F	

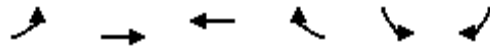
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 32 (23%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 8.2  
 Intersection LOS: A  
 Intersection Capacity Utilization 78.4%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 7: Ordner Dr & SR 82 Royalton Rd

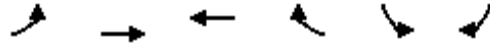


Lanes, Volumes, Timings  
 8: SR 82 Royalton Rd & Mall Drive (Target)



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	131	1178	1381	289	230	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325			240	100	100
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.88
Fr <sub>t</sub>				0.850		0.850
Fl <sub>t</sub> Protected	0.950				0.950	
Satd. Flow (prot)	1787	3406	3374	1599	3467	2814
Fl <sub>t</sub> Permitted	0.126				0.950	
Satd. Flow (perm)	237	3406	3374	1599	3467	2814
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				307		175
Link Speed (mph)		35	35		25	
Link Distance (ft)		832	436		432	
Travel Time (s)		16.2	8.5		11.8	
Peak Hour Factor	0.89	0.91	0.94	0.82	0.86	0.84
Heavy Vehicles (%)	1%	6%	7%	1%	1%	1%
Adj. Flow (vph)	147	1295	1469	352	267	175
Shared Lane Traffic (%)						
Lane Group Flow (vph)	147	1295	1469	352	267	175
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	100	100	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		3	
Permitted Phases	6			2		3
Detector Phase	1	6	2	2	3	3
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0	25.0	10.0	10.0
Minimum Split (s)	13.0	31.3	39.3	39.3	35.0	35.0
Total Split (s)	17.0	105.0	88.0	88.0	35.0	35.0

Lanes, Volumes, Timings  
 8: SR 82 Royalton Rd & Mall Drive (Target)

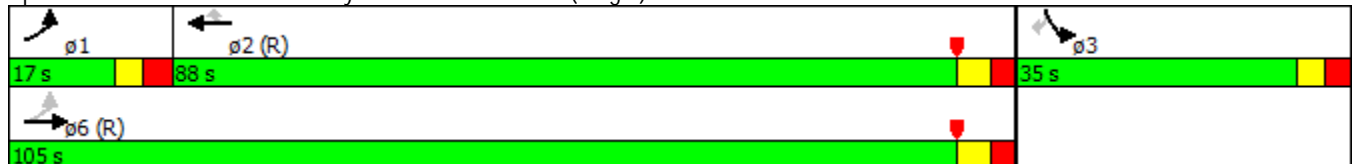


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (%)	12.1%	75.0%	62.9%	62.9%	25.0%	25.0%
Maximum Green (s)	11.0	98.7	81.7	81.7	29.1	29.1
Yellow Time (s)	3.0	3.6	3.6	3.6	3.0	3.0
All-Red Time (s)	3.0	2.7	2.7	2.7	2.9	2.9
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.0	-1.0
Total Lost Time (s)	4.3	4.6	4.6	4.6	4.9	4.9
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Walk Time (s)			10.0	10.0	6.0	6.0
Flash Dont Walk (s)			23.0	23.0	18.0	18.0
Pedestrian Calls (#/hr)			0	0	0	0
Act Effct Green (s)	113.7	113.4	98.8	98.8	17.1	17.1
Actuated g/C Ratio	0.81	0.81	0.71	0.71	0.12	0.12
v/c Ratio	0.48	0.47	0.62	0.29	0.63	0.35
Control Delay	21.9	0.6	3.6	1.2	65.0	9.2
Queue Delay	0.0	0.0	0.3	0.5	0.0	0.0
Total Delay	21.9	0.6	3.9	1.7	65.0	9.2
LOS	C	A	A	A	E	A
Approach Delay		2.8	3.5		42.9	
Approach LOS		A	A		D	

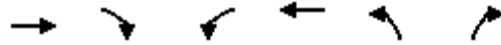
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:WBT and 6:EBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.63  
 Intersection Signal Delay: 7.9  
 Intersection Capacity Utilization 65.3%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service C

Splits and Phases: 8: SR 82 Royalton Rd & Mall Drive (Target)

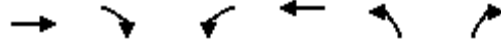


Lanes, Volumes, Timings  
 9: Pearlview & SR 82 Royalton Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	ø4	ø6
Lane Configurations	↑↑		↵	↑↑↑	↵			
Volume (vph)	1412	14	22	1448	21	30		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Storage Length (ft)		0	40		0	0		
Storage Lanes		0	1		1	0		
Taper Length (ft)			25		25			
Lane Util. Factor	0.95	0.95	1.00	0.91	1.00	1.00		
Frt	0.998				0.929			
Flt Protected			0.950		0.977			
Satd. Flow (prot)	3432	0	1770	4940	1692	0		
Flt Permitted			0.052		0.977			
Satd. Flow (perm)	3432	0	97	4940	1692	0		
Right Turn on Red		Yes				Yes		
Satd. Flow (RTOR)	1				35			
Link Speed (mph)	35			35	25			
Link Distance (ft)	828			161	466			
Travel Time (s)	16.1			3.1	12.7			
Peak Hour Factor	0.93	0.88	0.69	0.94	0.66	0.83		
Heavy Vehicles (%)	5%	2%	2%	5%	3%	1%		
Adj. Flow (vph)	1518	16	32	1540	32	36		
Shared Lane Traffic (%)								
Lane Group Flow (vph)	1534	0	32	1540	68	0		
Enter Blocked Intersection	No	No	No	No	No	No		
Lane Alignment	Left	Right	Left	Left	Left	Right		
Median Width(ft)	12			12	12			
Link Offset(ft)	0			0	0			
Crosswalk Width(ft)	16			16	16			
Two way Left Turn Lane								
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Turning Speed (mph)		9	15		15	9		
Number of Detectors	1		1	1	1			
Detector Template	Thru		Left	Thru	Left			
Leading Detector (ft)	100		20	100	20			
Trailing Detector (ft)	0		0	0	0			
Detector 1 Position(ft)	0		0	0	0			
Detector 1 Size(ft)	100		20	100	20			
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			
Detector 1 Channel								
Detector 1 Extend (s)	0.0		0.0	0.0	0.0			
Detector 1 Queue (s)	0.0		0.0	0.0	0.0			
Detector 1 Delay (s)	0.0		0.0	0.0	0.0			
Turn Type	NA		custom	NA	Prot			
Protected Phases	2		1	1 4 6	3		4	6
Permitted Phases			6					
Detector Phase	2		1	1 4 6	3			
Switch Phase								
Minimum Initial (s)	18.0		7.0		10.0		10.0	18.0
Minimum Split (s)	24.6		13.3		30.0		16.0	24.6
Total Split (s)	77.0		17.0		30.0		16.0	94.0

Lanes, Volumes, Timings  
 9: Pearlview & SR 82 Royalton Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	ø4	ø6
Total Split (%)	55.0%		12.1%		21.4%		11%	67%
Maximum Green (s)	70.4		11.0		24.0		10.0	87.4
Yellow Time (s)	3.6		3.0		3.0		3.0	3.6
All-Red Time (s)	3.0		3.0		3.0		3.0	3.0
Lost Time Adjust (s)	0.0		0.0		0.0			
Total Lost Time (s)	6.6		6.0		6.0			
Lead/Lag	Lag		Lead		Lead		Lag	
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0		3.5		3.5		3.5	3.0
Recall Mode	C-Max		None		None		None	C-Max
Walk Time (s)	7.0				7.0			7.0
Flash Dont Walk (s)	10.0				17.0			10.0
Pedestrian Calls (#/hr)	0				0			0
Act Effct Green (s)	70.4		88.0	105.1	22.9			
Actuated g/C Ratio	0.50		0.63	0.75	0.16			
v/c Ratio	0.89		0.17	0.42	0.22			
Control Delay	39.0		6.2	1.2	29.0			
Queue Delay	0.0		1.0	0.3	0.0			
Total Delay	39.0		7.2	1.5	29.0			
LOS	D		A	A	C			
Approach Delay	39.0			1.7	29.0			
Approach LOS	D			A	C			

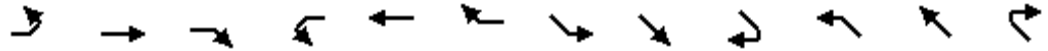
Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 7 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 20.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 58.3%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 9: Pearlview & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 29: SR 82 Royalton Rd & I-71 NB On Ramp



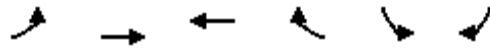
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑↑	↑		↑↑↑							
Volume (vph)	0	1665	886	0	1273	314	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850		0.970							
Flt Protected												
Satd. Flow (prot)	0	3438	1538	0	4747	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	3438	1538	0	4747	0	0	0	0	0	0	0
Link Speed (mph)		35			30			45			30	
Link Distance (ft)		953			266			386			430	
Travel Time (s)		18.6			6.0			5.8			9.8	
Confl. Peds. (#/hr)				3								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%	2%	6%	6%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	1810	963	0	1369	341	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1810	963	0	1710	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	58.2%
Analysis Period (min)	15
	ICU Level of Service B

# Lanes, Volumes, Timings

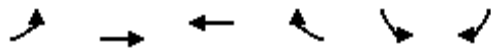
## 99: SR 82 Royalton Rd



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø1	ø2	ø3
Lane Configurations		↑↑	↑↑	↗	↘				
Volume (vph)	0	1442	1445	50	25	25			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	0			75	0	0			
Storage Lanes	0			1	1	0			
Taper Length (ft)	25				25				
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00			
Frt				0.850	0.932				
Flt Protected					0.976				
Satd. Flow (prot)	0	3438	3438	1583	1694	0			
Flt Permitted					0.976				
Satd. Flow (perm)	0	3438	3438	1583	1694	0			
Right Turn on Red				Yes		Yes			
Satd. Flow (RTOR)				18	27				
Link Speed (mph)		35	35		30				
Link Distance (ft)		161	832		289				
Travel Time (s)		3.1	16.2		6.6				
Peak Hour Factor	0.92	0.93	0.94	0.92	0.92	0.92			
Heavy Vehicles (%)	2%	5%	5%	2%	2%	2%			
Adj. Flow (vph)	0	1551	1537	54	27	27			
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	1551	1537	54	54	0			
Enter Blocked Intersection	No	No	No	No	No	No			
Lane Alignment	Left	Left	Left	Right	Left	Right			
Median Width(ft)		12	12		12				
Link Offset(ft)		0	0		0				
Crosswalk Width(ft)		16	16		16				
Two way Left Turn Lane									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Turning Speed (mph)	15			9	15	9			
Number of Detectors		2	2	1	1				
Detector Template		Thru	Thru	Right	Left				
Leading Detector (ft)		100	100	20	20				
Trailing Detector (ft)		0	0	0	0				
Detector 1 Position(ft)		0	0	0	0				
Detector 1 Size(ft)		6	6	20	20				
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				
Detector 1 Channel									
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				
Detector 2 Position(ft)		94	94						
Detector 2 Size(ft)		6	6						
Detector 2 Type		Cl+Ex	Cl+Ex						
Detector 2 Channel									
Detector 2 Extend (s)		0.0	0.0						
Turn Type		NA	NA	Perm	Prot				
Protected Phases		2 3	6		4		1	2	3
Permitted Phases				6					

# Lanes, Volumes, Timings

## 99: SR 82 Royalton Rd



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø1	ø2	ø3
Detector Phase		2 3	6	6	4				
Switch Phase									
Minimum Initial (s)			18.0	18.0	10.0		7.0	18.0	10.0
Minimum Split (s)			24.6	24.6	16.0		13.3	24.6	30.0
Total Split (s)			94.0	94.0	16.0		17.0	77.0	30.0
Total Split (%)			67.1%	67.1%	11.4%		12%	55%	21%
Maximum Green (s)			87.4	87.4	10.0		11.0	70.4	24.0
Yellow Time (s)			3.6	3.6	3.0		3.0	3.6	3.0
All-Red Time (s)			3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0				
Total Lost Time (s)			6.6	6.6	6.0				
Lead/Lag					Lag		Lead	Lag	Lead
Lead-Lag Optimize?									
Vehicle Extension (s)			3.0	3.0	3.5		3.5	3.0	3.5
Recall Mode			C-Max	C-Max	None		None	C-Max	None
Walk Time (s)			7.0	7.0				7.0	7.0
Flash Dont Walk (s)			10.0	10.0				10.0	17.0
Pedestrian Calls (#/hr)			0	0				0	0
Act Effect Green (s)		99.3	87.4	87.4	11.1				
Actuated g/C Ratio		0.71	0.62	0.62	0.08				
v/c Ratio		0.64	0.72	0.05	0.34				
Control Delay		0.9	21.2	11.6	41.8				
Queue Delay		1.2	0.0	0.0	0.0				
Total Delay		2.1	21.2	11.6	41.8				
LOS		A	C	B	D				
Approach Delay		2.1	20.9		41.8				
Approach LOS		A	C		D				

### Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 7 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 12.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 58.8%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 99: SR 82 Royalton Rd





## **Appendix D**

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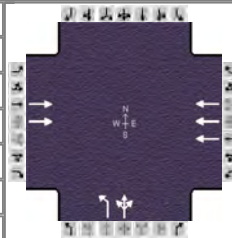
### **HCS Analysis**



## **HCS Analysis – No Build AM Peak**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		662			1362		266	0	116			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	77.1	49.7	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	0.0	0.0	0.0	0.0				
		Red	3.0	3.0	0.0	0.0	0.0	0.0				

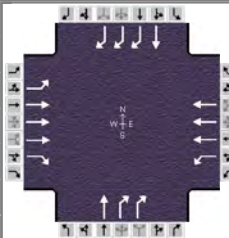
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		83.7		83.7		56.3		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						20.6		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.6		
Phase Call Probability						1.00		
Max Out Probability						0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2017			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		77.1			27.4		18.6	18.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		77.1			27.4		18.6	18.6				
Green Ratio (g/C)		0.55			0.55		0.36	0.36				
Capacity (c), veh/h		1897			2689		600	600				
Volume-to-Capacity Ratio (X)		1.063			0.551		0.482	0.482				
Available Capacity (c <sub>a</sub> ), veh/h		1897			2689		600	600				
Back of Queue (Q), veh/ln (95th percentile)		15.9			15.6		12.3	12.3				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		8.6			20.3		35.1	35.1				
Incremental Delay (d <sub>2</sub> ), s/veh		31.1			0.8		0.6	0.6				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		39.7			21.1		35.7	35.7				
Level of Service (LOS)		F			C		D	D				
Approach Delay, s/veh / LOS	39.7		D	21.1		C	34.5		C	0.0		
Intersection Delay, s/veh / LOS	32.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1717	230	107	739			0	318		0	908

Signal Information				Phase Diagram										
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On											
Force Mode	Fixed	Simult. Gap N/S	On											
Green	13.4	58.4	19.4	22.4	0.0	0.0	1		2		3		4	
Yellow	3.6	3.6	3.6	3.6	0.0	0.0	5		6		7		8	
Red	3.0	3.0	3.0	3.0	0.0	0.0								

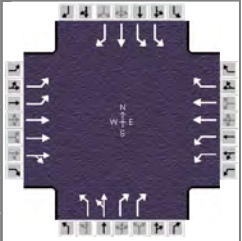
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	20.0	85.0	26.0	91.0		29.0		29.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		20.1			16.6		24.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		3.3		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.84		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2		4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1773	237	224	1546		0	346		0	987	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	995	1533	1707	1628		1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	78.4	19.8	18.1	27.1		0.0	14.6		0.0	22.4	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	78.4	19.8	18.1	27.1		0.0	14.6		0.0	22.4	
Green Ratio (g/C)	0.10	0.56	0.56	0.14	0.60		0.16	0.30		0.16	0.26	
Capacity (c), veh/h	173	1671	859	237	2944		304	795		304	1022	
Volume-to-Capacity Ratio (X)	0.006	1.061	0.277	0.946	0.525		0.000	0.435		0.000	0.966	
Available Capacity (c <sub>a</sub> ), veh/h	173	1671	859	237	2944		304	795		304	1022	
Back of Queue (Q), veh/ln (95th percentile)	0.1	30.9	11.4	14.3	15.0		0.0	8.4		0.0	19.2	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.50		0.00	0.63	
Uniform Delay (d <sub>1</sub> ), s/veh	60.8	46.7	35.9	53.3	17.6		0.0	39.6		0.0	51.5	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	31.7	0.2	38.8	0.6		0.0	0.4		0.0	20.3	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	60.8	78.4	36.2	92.1	18.2		0.0	40.0		0.0	71.8	
Level of Service (LOS)	E	F	D	F	B			D			E	
Approach Delay, s/veh / LOS	73.4	E		27.5	C		40.0	D		71.8	E	
Intersection Delay, s/veh / LOS	55.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.5	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.7	A	1.0	A	1.1	A	2.1	B

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	28	1062	59	400	1227	48	116	32	846	39	3	11

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	26.4	31.8	14.4	16.4	18.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0		
				Red	3.0	3.0	3.0	3.0	3.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	21.0	59.4	33.0	71.4		24.6		23.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	3.0		24.7			20.0		3.5
Green Extension Time (g <sub>e</sub> ), s	4.0	0.0	0.5	0.0		0.0		0.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.30		1.00			1.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	28	556	577	605	1855	73	126	35	920	42	3	12
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	856	1776	1723	1723	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	1.0	37.2	37.2	22.7	64.8	0.9	9.4	2.3	18.0	1.5	0.2	0.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.0	37.2	37.2	22.7	64.8	0.9	9.4	2.3	18.0	1.5	0.2	0.8
Green Ratio (g/C)	0.10	0.38	0.38	0.19	0.46	0.58	0.13	0.13	0.32	0.12	0.12	0.22
Capacity (c), veh/h	358	646	670	650	1595	916	226	242	895	404	220	351
Volume-to-Capacity Ratio (X)	0.079	0.861	0.862	0.931	1.163	0.079	0.558	0.144	1.028	0.105	0.015	0.034
Available Capacity (c <sub>a</sub> ), veh/h	358	646	670	650	1595	916	226	242	895	404	220	351
Back of Queue (Q), veh/ln (95th percentile)	0.8	11.1	20.3	10.2	43.8	0.3	7.8	2.0	27.7	1.2	0.2	0.6
Queue Storage Ratio (RQ) (95th percentile)	0.13	0.00	0.00	0.45	0.00	0.03	0.67	0.00	0.00	0.28	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	53.9	24.0	23.8	31.3	17.0	1.8	57.3	54.2	47.8	55.2	54.7	42.9
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	12.8	12.4	14.8	78.5	0.1	3.0	0.3	37.3	0.1	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	54.0	36.7	36.2	46.0	95.5	1.9	60.3	54.4	85.1	55.4	54.7	42.9
Level of Service (LOS)	D	D	D	D	F	A	E	D	F	E	D	D
Approach Delay, s/veh / LOS	36.9		D	81.0		F	81.2		F	52.7		D
Intersection Delay, s/veh / LOS	70.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	2.0	A	2.3	B	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	21	1050	39	41	1166	60	4	1	11	59	3	10

Signal Information															
Cycle, s	140.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
		Green		8.4	62.9	20.9	21.4	0.0	0.0						
		Yellow		3.6	3.6	3.6	3.6	0.0	0.0						
		Red		3.0	3.0	3.0	3.0	0.0	0.0						

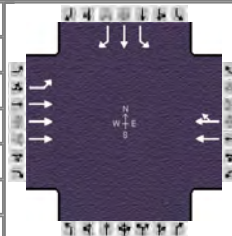
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	15.0	69.5	15.0	69.5	27.5	28.0	27.5	28.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.9		4.3		2.1	2.8	6.4	3.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.12		0.97		0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	22	755	371	56	842	835	4	1	12	64	14	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1758	1740	1792	1761	1740	1881	1594	1792	1652	
Queue Service Time (g <sub>s</sub> ), s	0.9	9.6	9.5	2.3	62.9	62.9	0.1	0.1	0.8	4.4	1.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.9	9.6	9.5	2.3	62.9	62.9	0.1	0.1	0.8	4.4	1.0	
Green Ratio (g/C)	0.51	0.45	0.45	0.06	0.45	0.45	0.15	0.15	0.21	0.15	0.15	
Capacity (c), veh/h	158	1611	790	209	805	791	519	288	339	267	253	
Volume-to-Capacity Ratio (X)	0.138	0.469	0.469	0.269	1.045	1.055	0.008	0.004	0.035	0.240	0.056	
Available Capacity (c <sub>a</sub> ), veh/h	158	1611	790	209	805	791	519	288	339	267	253	
Back of Queue (Q), veh/ln (95th percentile)	0.7	5.4	5.6	1.5	29.3	29.9	0.1	0.1	0.6	3.7	0.8	
Queue Storage Ratio (RQ) (95th percentile)	0.09	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.08	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	33.2	8.9	8.8	66.8	23.4	23.3	50.7	50.3	43.7	52.5	50.7	
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.9	1.8	0.1	24.3	28.2	0.0	0.0	0.0	0.5	0.1	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	33.5	9.8	10.6	66.9	47.7	51.4	50.7	50.3	43.7	53.0	50.8	
Level of Service (LOS)	C	A	B	E	F	F	D	D	D	D	D	
Approach Delay, s/veh / LOS	10.5		B	50.1		D	45.9		D	52.6		D
Intersection Delay, s/veh / LOS	34.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.5	A	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	54	1028			1082	67				47	0	40

Signal Information														
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	5.4	60.8	54.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
				Red	3.0	3.0	3.0	0.0	0.0	0.0				

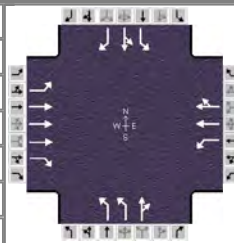
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.0	79.4		67.4				60.6
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.2
Queue Clearance Time (g <sub>s</sub> ), s	4.4							4.5
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	58	1097			772	762				51	0	43
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1755				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	2.4	6.0			43.0	60.6				2.5	0.0	2.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.4	6.0			43.0	60.6				2.5	0.0	2.5
Green Ratio (g/C)	0.49	0.52			0.43	0.43				0.39	0.39	0.39
Capacity (c), veh/h	121	2539			778	762				684	733	597
Volume-to-Capacity Ratio (X)	0.476	0.432			0.992	0.999				0.075	0.000	0.073
Available Capacity (c <sub>a</sub> ), veh/h	121	2539			778	762				684	733	597
Back of Queue (Q), veh/ln (95th percentile)	4.0	2.8			15.1	15.5				2.0	0.0	1.7
Queue Storage Ratio (RQ) (95th percentile)	0.77	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.4	4.3			16.1	16.3				27.2	0.0	27.2
Incremental Delay (d <sub>2</sub> ), s/veh	2.3	0.4			8.1	9.6				0.0	0.0	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.7	4.7			24.2	25.8				27.2	0.0	27.2
Level of Service (LOS)	D	A			C	C				C		C
Approach Delay, s/veh / LOS	6.3	A		25.0	C		0.0			27.2		C
Intersection Delay, s/veh / LOS	17.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.5	A			0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	42	1040	106	51	1016	133	31	8	17	5	0	6

Signal Information				Signal Timing (s)								Signal Phases			
Cycle, s	140.0	Reference Phase	2	Green	10.4	54.6	21.4	27.2	0.0	0.0	1	2	3	4	
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	3.6	0.0	0.0	5	6	7	8	
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	3.0	3.0	3.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On												

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	17.0	61.2	17.0	61.2		33.8		28.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.9		6.9			3.8		2.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.2		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.05		1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	46	1130	115	63	724	701	34	27		5	0	7
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1720	1740	1693		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	1.9	25.7	4.5	4.9	54.6	54.6	1.1	1.8		0.4	0.0	0.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.9	25.7	4.5	4.9	54.6	54.6	1.1	1.8		0.4	0.0	0.4
Green Ratio (g/C)	0.46	0.39	0.58	0.07	0.39	0.39	0.19	0.19		0.15	0.15	0.23
Capacity (c), veh/h	186	1904	931	133	699	671	676	329		277	290	362
Volume-to-Capacity Ratio (X)	0.246	0.594	0.124	0.475	1.036	1.045	0.050	0.083		0.020	0.000	0.018
Available Capacity (c <sub>a</sub> ), veh/h	186	1904	931	133	699	671	676	329		277	290	362
Back of Queue (Q), veh/ln (95th percentile)	2.8	15.6	3.0	3.4	21.1	20.7	0.9	1.4		0.3	0.0	0.3
Queue Storage Ratio (RQ) (95th percentile)	0.40	0.00	0.14	0.23	0.00	0.00	0.00	0.00		0.00	0.00	0.07
Uniform Delay (d <sub>1</sub> ), s/veh	31.3	33.9	13.0	67.2	19.7	19.3	45.9	46.2		50.4	0.0	42.0
Incremental Delay (d <sub>2</sub> ), s/veh	0.7	1.4	0.3	0.4	24.3	27.7	0.0	0.1		0.0	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	31.9	35.3	13.3	67.6	44.0	47.0	45.9	46.3		50.4	0.0	42.0
Level of Service (LOS)	C	D	B	E	F	F	D	D		D		D
Approach Delay, s/veh / LOS	33.2		C	46.4		D	46.1		D	45.8		D
Intersection Delay, s/veh / LOS	40.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.6	A	0.5	A

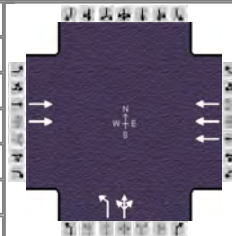




## **HCS Analysis – AM Peak Proposed**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		662			1362		266	0	116			

Signal Information				Signal Timing (s)										
Cycle, s	140.0	Reference Phase	2	Green	80.7	46.1	0.0	0.0	0.0	0.0	1	2	3	4
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	0.0	0.0	0.0	0.0	5	6	7	8
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	3.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On											

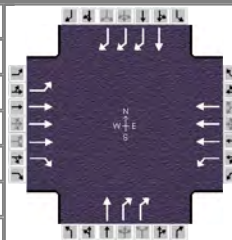
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		87.3		87.3		52.7		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						21.4		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.5		
Phase Call Probability						1.00		
Max Out Probability						0.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2113			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		80.7			25.8		19.4	19.4				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		80.7			25.8		19.4	19.4				
Green Ratio (g/C)		0.58			0.58		0.33	0.33				
Capacity (c), veh/h		1986			2814		557	557				
Volume-to-Capacity Ratio (X)		1.064			0.526		0.519	0.519				
Available Capacity (c <sub>a</sub> ), veh/h		1986			2814		557	557				
Back of Queue (Q), veh/ln (95th percentile)		15.4			14.8		12.8	12.8				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		2.8			18.0		38.0	38.0				
Incremental Delay (d <sub>2</sub> ), s/veh		34.8			0.7		0.9	0.9				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		37.5			18.7		38.8	38.8				
Level of Service (LOS)		F			B		D	D				
Approach Delay, s/veh / LOS	37.5		D	18.7		B	37.5		D	0.0		
Intersection Delay, s/veh / LOS	30.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1717	230	107	739			0	318		0	908

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.4	51.0	19.4	29.8	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

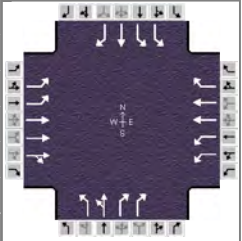
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	20.0	77.6	26.0	83.6		36.4		36.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		20.1			15.5		31.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		6.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.28		1.00

Movement Group Results	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Assigned Movement	1	6	16	5	2			4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1767	237	224	1546			0	346		0	987	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1291	1533	1707	1628			1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	61.3	20.4	18.1	28.5			0.0	13.5		0.0	29.8	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	61.3	20.4	18.1	28.5			0.0	13.5		0.0	29.8	
Green Ratio (g/C)	0.10	0.51	0.51	0.14	0.55			0.21	0.35		0.21	0.31	
Capacity (c), veh/h	173	1965	778	237	2685			404	936		404	1233	
Volume-to-Capacity Ratio (X)	0.006	0.900	0.304	0.946	0.576			0.000	0.369		0.000	0.801	
Available Capacity (c <sub>a</sub> ), veh/h	173	1965	778	237	2685			404	936		404	1233	
Back of Queue (Q), veh/ln (95th percentile)	0.1	26.4	12.7	14.4	15.5			0.0	7.9		0.0	16.2	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.46		0.00	0.54	
Uniform Delay (d <sub>1</sub> ), s/veh	62.8	46.0	41.3	54.1	19.8			0.0	33.8		0.0	44.4	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	3.6	0.5	39.2	0.8			0.0	0.2		0.0	3.9	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	62.8	49.6	41.8	93.3	20.6			0.0	34.1		0.0	48.3	
Level of Service (LOS)	E	D	D	F	C				C			D	
Approach Delay, s/veh / LOS	48.7		D	29.8		C		34.1		C	48.3		D
Intersection Delay, s/veh / LOS	41.1						D						

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.7	A	1.0	A	1.1	A	2.1	B

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak_Proposed.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	28	1062	59	400	1227	48	116	32	846	39	3	11

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	26.4	32.1	14.4	16.4	17.7	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0		
				Red	3.0	3.0	3.0	3.0	3.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	21.0	59.7	33.0	71.7		24.3		23.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	3.0		25.6			19.7		3.5
Green Extension Time (g <sub>e</sub> ), s	4.0	0.0	0.3	0.0		0.0		0.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.29		1.00			1.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	28	690	444	605	1855	73	126	35	920	42	3	12
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1375	1767	1723	1723	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	1.0	22.8	22.7	23.6	65.1	0.9	9.5	2.3	17.7	1.5	0.2	0.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.0	22.8	22.7	23.6	65.1	0.9	9.5	2.3	17.7	1.5	0.2	0.8
Green Ratio (g/C)	0.10	0.38	0.38	0.19	0.46	0.58	0.13	0.13	0.32	0.12	0.12	0.22
Capacity (c), veh/h	358	1043	670	650	1602	919	222	238	889	404	220	351
Volume-to-Capacity Ratio (X)	0.079	0.661	0.662	0.931	1.158	0.079	0.568	0.146	1.035	0.105	0.015	0.034
Available Capacity (c <sub>a</sub> ), veh/h	358	1043	670	650	1602	919	222	238	889	404	220	351
Back of Queue (Q), veh/ln (95th percentile)	0.8	10.1	12.6	14.0	45.6	0.3	7.8	2.0	27.9	1.2	0.2	0.6
Queue Storage Ratio (RQ) (95th percentile)	0.13	0.00	0.00	0.62	0.00	0.03	0.67	0.00	0.00	0.28	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	53.9	21.1	20.9	42.4	18.3	1.8	57.5	54.4	48.0	55.2	54.7	42.9
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	3.0	4.6	15.5	76.5	0.1	3.4	0.3	39.4	0.1	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	54.0	24.1	25.5	57.9	94.8	1.9	60.9	54.7	87.4	55.4	54.7	42.9
Level of Service (LOS)	D	C	C	E	F	A	E	D	F	E	D	D
Approach Delay, s/veh / LOS	25.3	C		83.3	F		83.3	F		52.7	D	
Intersection Delay, s/veh / LOS	69.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	2.0	A	2.3	B	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak_Proposed.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	21	1050	39	41	1166	60	4	1	11	59	3	10

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	8.4	62.9	20.9	21.4	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

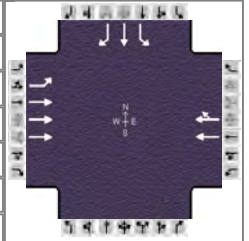
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	15.0	69.5	15.0	69.5	27.5	28.0	27.5	28.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.9		4.3		2.1	2.8	6.4	3.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.12		0.98		0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	22	755	371	56	845	838	4	1	12	64	14	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1758	1740	1792	1761	1740	1881	1594	1792	1652	
Queue Service Time (g <sub>s</sub> ), s	0.9	9.6	9.5	2.3	62.9	62.9	0.1	0.1	0.8	4.4	1.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.9	9.6	9.5	2.3	62.9	62.9	0.1	0.1	0.8	4.4	1.0	
Green Ratio (g/C)	0.51	0.45	0.45	0.06	0.45	0.45	0.15	0.15	0.21	0.15	0.15	
Capacity (c), veh/h	158	1611	790	209	805	791	519	288	339	267	253	
Volume-to-Capacity Ratio (X)	0.138	0.469	0.469	0.270	1.050	1.060	0.008	0.004	0.035	0.240	0.056	
Available Capacity (c <sub>a</sub> ), veh/h	158	1611	790	209	805	791	519	288	339	267	253	
Back of Queue (Q), veh/ln (95th percentile)	0.7	5.4	5.6	1.5	29.8	30.5	0.1	0.1	0.6	3.7	0.8	
Queue Storage Ratio (RQ) (95th percentile)	0.09	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.08	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	33.2	8.9	8.8	66.8	23.4	23.3	50.7	50.3	43.7	52.5	50.7	
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.9	1.8	0.1	26.0	30.0	0.0	0.0	0.0	0.5	0.1	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	33.5	9.8	10.6	66.9	49.4	53.3	50.7	50.3	43.7	53.0	50.8	
Level of Service (LOS)	C	A	B	E	F	F	D	D	D	D	D	
Approach Delay, s/veh / LOS	10.5		B	51.9		D	45.9		D	52.6		D
Intersection Delay, s/veh / LOS	35.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.5	A	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	54	1028			1082	67				47	0	40

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Offset, s	0	Reference Point	End	Green	5.4	60.8	54.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

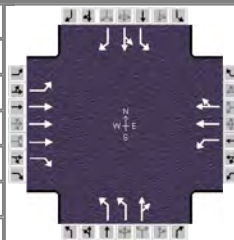
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.0	79.4		67.4				60.6
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.2
Queue Clearance Time (g <sub>s</sub> ), s	4.4							4.5
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	58	1097			772	762				51	0	43
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1755				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	2.4	6.0			43.0	60.6				2.5	0.0	2.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.4	6.0			43.0	60.6				2.5	0.0	2.5
Green Ratio (g/C)	0.49	0.52			0.43	0.43				0.39	0.39	0.39
Capacity (c), veh/h	121	2539			778	762				684	733	597
Volume-to-Capacity Ratio (X)	0.476	0.432			0.992	0.999				0.075	0.000	0.073
Available Capacity (c <sub>a</sub> ), veh/h	121	2539			778	762				684	733	597
Back of Queue (Q), veh/ln (95th percentile)	4.0	2.8			15.1	15.5				2.0	0.0	1.7
Queue Storage Ratio (RQ) (95th percentile)	0.77	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.4	4.3			16.1	16.3				27.2	0.0	27.2
Incremental Delay (d <sub>2</sub> ), s/veh	2.3	0.4			8.1	9.6				0.0	0.0	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.7	4.7			24.2	25.8				27.2	0.0	27.2
Level of Service (LOS)	D	A			C	C				C		C
Approach Delay, s/veh / LOS	6.3	A		25.0	C		0.0			27.2	C	
Intersection Delay, s/veh / LOS	17.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.5	A			0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	42	1040	106	51	1016	133	31	8	17	5	0	6

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		10.4	54.6	21.4	27.2	0.0	0.0				
		Yellow		3.6	3.6	3.6	3.6	0.0	0.0				
		Red		3.0	3.0	3.0	3.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	17.0	61.2	17.0	61.2		33.8		28.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.9		6.9			3.8		2.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.2		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.05		1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	46	1130	115	63	724	701	34	27		5	0	7
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1720	1740	1693		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	1.9	25.7	4.5	4.9	54.6	54.6	1.1	1.8		0.4	0.0	0.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.9	25.7	4.5	4.9	54.6	54.6	1.1	1.8		0.4	0.0	0.4
Green Ratio (g/C)	0.46	0.39	0.58	0.07	0.39	0.39	0.19	0.19		0.15	0.15	0.23
Capacity (c), veh/h	186	1904	931	133	699	671	676	329		277	290	362
Volume-to-Capacity Ratio (X)	0.246	0.594	0.124	0.475	1.036	1.045	0.050	0.083		0.020	0.000	0.018
Available Capacity (c <sub>a</sub> ), veh/h	186	1904	931	133	699	671	676	329		277	290	362
Back of Queue (Q), veh/ln (95th percentile)	2.8	15.6	3.0	3.4	21.1	20.7	0.9	1.4		0.3	0.0	0.3
Queue Storage Ratio (RQ) (95th percentile)	0.40	0.00	0.14	0.23	0.00	0.00	0.00	0.00		0.00	0.00	0.07
Uniform Delay (d <sub>1</sub> ), s/veh	31.3	33.9	13.0	67.2	19.7	19.3	45.9	46.2		50.4	0.0	42.0
Incremental Delay (d <sub>2</sub> ), s/veh	0.7	1.4	0.3	0.4	24.3	27.7	0.0	0.1		0.0	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	31.9	35.3	13.3	67.6	44.0	47.0	45.9	46.3		50.4	0.0	42.0
Level of Service (LOS)	C	D	B	E	F	F	D	D		D		D
Approach Delay, s/veh / LOS	33.2		C	46.4		D	46.1		D	45.8		D
Intersection Delay, s/veh / LOS	40.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.6	A	0.5	A

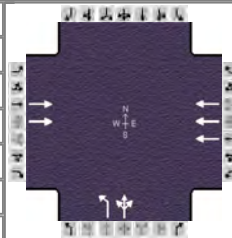


## **HCS Analysis – AM Peak Proposed with U-Turns**



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed_Uturns.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		662			1362		266	0	116			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	81.4	45.4	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	0.0	0.0	0.0	0.0				
		Red	3.0	3.0	0.0	0.0	0.0	0.0				

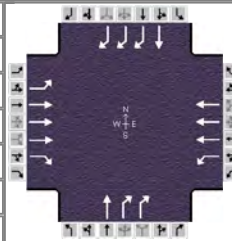
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		88.0		88.0		52.0		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						21.5		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.5		
Phase Call Probability						1.00		
Max Out Probability						0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2128			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		81.4			25.5		19.5	19.5				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		81.4			25.5		19.5	19.5				
Green Ratio (g/C)		0.58			0.58		0.32	0.32				
Capacity (c), veh/h		2003			2839		548	548				
Volume-to-Capacity Ratio (X)		1.062			0.521		0.527	0.527				
Available Capacity (c <sub>a</sub> ), veh/h		2003			2839		548	548				
Back of Queue (Q), veh/ln (95th percentile)		16.1			14.6		12.9	12.9				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		3.2			17.6		38.6	38.6				
Incremental Delay (d <sub>2</sub> ), s/veh		34.9			0.7		0.9	0.9				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		38.1			18.3		39.5	39.5				
Level of Service (LOS)		F			B		D	D				
Approach Delay, s/veh / LOS	38.1		D	18.3		B	38.1		D	0.0		
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed_Uturns.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1717	230	107	739			0	318		0	908

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.3	58.3	13.3	28.7	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

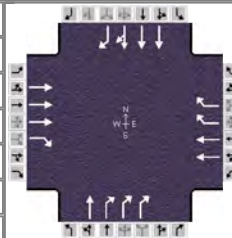
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	19.9	84.8	19.9	84.8		35.3		35.3
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		15.3			16.6		30.7
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		5.5		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.37		1.00

Movement Group Results	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Assigned Movement	1	6	16	5	2			4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1782	239	224	1546			0	346		0	987	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1291	1533	1707	1628			1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	52.4	11.0	13.3	28.3			0.0	14.6		0.0	28.7	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	52.4	11.0	13.3	28.3			0.0	14.6		0.0	28.7	
Green Ratio (g/C)	0.10	0.56	0.56	0.10	0.56			0.21	0.30		0.21	0.30	
Capacity (c), veh/h	172	2164	857	162	2727			390	799		390	1199	
Volume-to-Capacity Ratio (X)	0.006	0.824	0.279	1.380	0.567			0.000	0.433		0.000	0.823	
Available Capacity (c <sub>a</sub> ), veh/h	172	2164	857	162	2727			390	799		390	1199	
Back of Queue (Q), veh/ln (95th percentile)	0.1	21.6	6.8	22.5	15.5			0.0	8.4		0.0	16.5	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.49		0.00	0.54	
Uniform Delay (d <sub>1</sub> ), s/veh	60.5	24.8	15.5	59.4	19.5			0.0	39.4		0.0	45.6	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	2.8	0.6	200.0	0.7			0.0	0.4		0.0	4.8	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	60.5	27.7	16.1	259.4	20.2			0.0	39.8		0.0	50.3	
Level of Service (LOS)	E	C	B	F	C				D			D	
Approach Delay, s/veh / LOS	26.3		C	50.5		D		39.8		D	50.3		D
Intersection Delay, s/veh / LOS	40.2						D						

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.5		B	2.6		B	3.3		C	3.4		C
Bicycle LOS Score / LOS	1.7		A	1.0		A	1.1		A	2.1		B

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed_Uturns.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		1090	59		1627	48		148	846		42	11

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	92.2	34.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

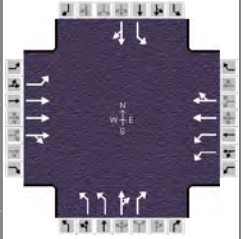
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		8
Case Number		7.0		7.0		7.0		7.0
Phase Duration, s		98.8		98.8		41.2		41.2
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		6.6
Max Allow Headway (MAH), s		0.0		0.0		4.3		4.3
Queue Clearance Time (g <sub>s</sub> ), s						31.3		2.9
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.8		6.3
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16		2	12		4	14		8	18
Adjusted Flow Rate (v), veh/h		1102	60		2460	73		161	920		46	12
Adjusted Saturation Flow Rate (s), veh/h/ln		1411	1610		1723	1397		1881	1411		1881	1594
Queue Service Time (g <sub>s</sub> ), s		12.7	1.2		92.2	0.6		9.9	29.3		0.9	0.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s		12.7	1.2		92.2	0.6		9.9	29.3		0.9	0.8
Green Ratio (g/C)		0.66	0.66		0.66	0.66		0.25	0.25		0.25	0.25
Capacity (c), veh/h		2787	1060		2269	1840		465	1046		1395	394
Volume-to-Capacity Ratio (X)		0.395	0.056		1.084	0.039		0.346	0.879		0.033	0.030
Available Capacity (c <sub>a</sub> ), veh/h		2787	1060		2269	1840		465	1046		1395	394
Back of Queue (Q), veh/ln (95th percentile)		6.1	0.8		50.2	0.3		8.2	16.6		0.7	0.6
Queue Storage Ratio (RQ) (95th percentile)		0.00	0.00		0.00	0.03		0.00	0.00		0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh		7.4	5.4		14.9	3.8		43.4	50.7		40.0	40.0
Incremental Delay (d <sub>2</sub> ), s/veh		0.4	0.1		44.0	0.0		0.4	8.7		0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Control Delay (d), s/veh		7.8	5.5		58.9	3.8		43.8	59.4		40.0	40.0
Level of Service (LOS)		A	A		F	A		D	E		D	D
Approach Delay, s/veh / LOS	7.7	A		57.3	E		57.1	E		40.0	D	
Intersection Delay, s/veh / LOS	45.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	2.0	A	2.3	B	0.5	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed_Uturns.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	21	1050	39	41	1166	60	4	1	11	59	3	10

Signal Information															
Cycle, s	140.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
		Green		8.4	79.0	10.4	15.8	0.0	0.0						
		Yellow		3.6	3.6	3.6	3.6	0.0	0.0						
		Red		3.0	3.0	3.0	3.0	0.0	0.0						

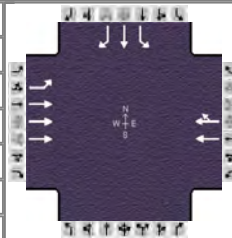
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	15.0	85.6	15.0	85.6	17.0	22.4	17.0	22.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.7		5.0		2.2	2.9	6.8	3.1
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.08		1.00		0.00	0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	22	755	371	74	1104	1104	4	1	12	64	14	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1758	1740	1792	1761	1740	1881	1594	1792	1652	
Queue Service Time (g <sub>s</sub> ), s	0.7	7.8	7.7	3.0	79.0	79.0	0.2	0.1	0.9	4.8	1.1	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.7	7.8	7.7	3.0	79.0	79.0	0.2	0.1	0.9	4.8	1.1	
Green Ratio (g/C)	0.62	0.56	0.56	0.06	0.56	0.56	0.07	0.11	0.17	0.07	0.11	
Capacity (c), veh/h	158	2023	992	209	1011	994	258	212	276	133	186	
Volume-to-Capacity Ratio (X)	0.138	0.373	0.374	0.354	1.091	1.110	0.017	0.005	0.043	0.482	0.076	
Available Capacity (c <sub>a</sub> ), veh/h	158	2023	992	209	1011	994	258	212	276	133	186	
Back of Queue (Q), veh/ln (95th percentile)	0.8	4.6	4.7	1.9	38.6	41.2	0.1	0.1	0.6	4.1	0.8	
Queue Storage Ratio (RQ) (95th percentile)	0.10	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.09	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	34.3	6.3	6.3	67.3	16.2	16.2	60.1	55.1	48.3	62.2	55.6	
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.5	1.0	0.1	42.8	51.2	0.0	0.0	0.1	2.7	0.2	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	34.7	6.8	7.3	67.4	59.0	67.4	60.1	55.1	48.3	64.9	55.7	
Level of Service (LOS)	C	A	A	E	F	F	E	E	D	E	E	
Approach Delay, s/veh / LOS	7.5		A	63.3		E	51.7		D	63.2		E
Intersection Delay, s/veh / LOS	45.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.5	A	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed_Uturns.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	54	1028			1082	67				47	0	40

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Offset, s	0	Reference Point	End	Green	5.4	73.0	41.8	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

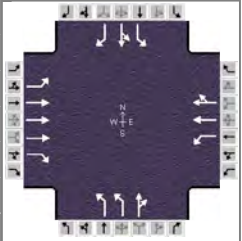
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.0	91.6		79.6				48.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.2
Queue Clearance Time (g <sub>s</sub> ), s	4.0							4.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	58	1097			962	961				51	0	43
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1756				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	2.0	5.8			36.4	73.0				2.9	0.0	2.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.0	5.8			36.4	73.0				2.9	0.0	2.8
Green Ratio (g/C)	0.57	0.61			0.52	0.52				0.30	0.30	0.30
Capacity (c), veh/h	121	2964			935	915				530	567	462
Volume-to-Capacity Ratio (X)	0.478	0.370			1.029	1.050				0.096	0.000	0.094
Available Capacity (c <sub>a</sub> ), veh/h	121	2964			935	915				530	567	462
Back of Queue (Q), veh/ln (95th percentile)	2.1	2.9			21.1	23.3				2.3	0.0	2.0
Queue Storage Ratio (RQ) (95th percentile)	0.40	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.5	3.8			13.9	13.9				35.5	0.0	35.4
Incremental Delay (d <sub>2</sub> ), s/veh	2.6	0.3			17.8	25.8				0.1	0.0	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	37.1	4.1			31.7	39.6				35.5	0.0	35.5
Level of Service (LOS)	D	A			F	F				D		D
Approach Delay, s/veh / LOS	5.7	A		35.7	D		0.0			35.5		D
Intersection Delay, s/veh / LOS	24.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.5	A			0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Proposed_Uturns.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	42	1040	106	51	1016	133	31	8	17	5	0	6

Signal Information				Signal Phases											
Cycle, s	140.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	7.4	3.0	64.0	16.4	22.8	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	0.0	3.6	3.6	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	3.0	3.0	3.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	17.0	73.6	14.0	70.6		29.4		23.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.7		7.9			3.9		2.5
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.1		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.04		1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	46	1130	115	76	863	848	34	27		5	0	7
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1720	1740	1693		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	1.7	22.0	3.9	5.9	64.0	64.0	1.1	1.9		0.4	0.0	0.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.7	22.0	3.9	5.9	64.0	64.0	1.1	1.9		0.4	0.0	0.5
Green Ratio (g/C)	0.53	0.48	0.64	0.05	0.46	0.46	0.16	0.16		0.12	0.12	0.19
Capacity (c), veh/h	186	2337	1023	95	819	786	567	276		212	223	305
Volume-to-Capacity Ratio (X)	0.246	0.484	0.113	0.802	1.053	1.078	0.059	0.099		0.026	0.000	0.021
Available Capacity (c <sub>a</sub> ), veh/h	186	2337	1023	95	819	786	567	276		212	223	305
Back of Queue (Q), veh/ln (95th percentile)	1.3	13.4	2.5	3.8	23.0	24.7	0.9	1.5		0.3	0.0	0.3
Queue Storage Ratio (RQ) (95th percentile)	0.19	0.00	0.11	0.26	0.00	0.00	0.00	0.00		0.00	0.00	0.07
Uniform Delay (d <sub>1</sub> ), s/veh	30.4	24.8	9.7	69.2	16.3	16.0	49.5	49.9		54.7	0.0	46.0
Incremental Delay (d <sub>2</sub> ), s/veh	0.7	0.7	0.2	4.5	27.3	37.8	0.0	0.2		0.0	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	31.1	25.5	9.9	73.8	43.7	53.9	49.6	50.0		54.8	0.0	46.0
Level of Service (LOS)	C	C	A	E	F	F	D	D		D		D
Approach Delay, s/veh / LOS	24.3		C	49.8		D	49.8		D	50.0		D
Intersection Delay, s/veh / LOS	39.3						D					

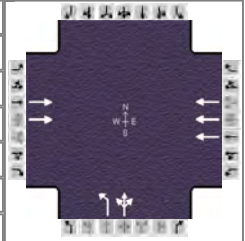
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.6	A	0.5	A



## **HCS Analysis – AM Peak Traditional Widening**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		662			1362		266	0	116			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	81.8	45.0	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	0.0	0.0	0.0	0.0				
		Red	3.0	3.0	0.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		88.4		88.4		51.6		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						21.6		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.5		
Phase Call Probability						1.00		
Max Out Probability						0.00		

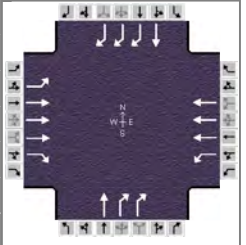
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2140			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		81.8			25.3		19.6	19.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		81.8			25.3		19.6	19.6				
Green Ratio (g/C)		0.58			0.58		0.32	0.32				
Capacity (c), veh/h		2013			2853		544	544				
Volume-to-Capacity Ratio (X)		1.063			0.519		0.532	0.532				
Available Capacity (c <sub>a</sub> ), veh/h		2013			2853		544	544				
Back of Queue (Q), veh/ln (95th percentile)		16.1			14.5		13.0	13.0				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		3.0			17.4		38.9	38.9				
Incremental Delay (d <sub>2</sub> ), s/veh		35.1			0.7		1.0	1.0				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		38.2			18.0		39.9	39.9				
Level of Service (LOS)		F			B		D	D				
Approach Delay, s/veh / LOS	38.2		D	18.0		B	38.5		D	0.0		
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 AM Peak_Traditional Widening.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1717	230	107	739			0	318		0	908

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.3	58.2	13.4	28.7	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

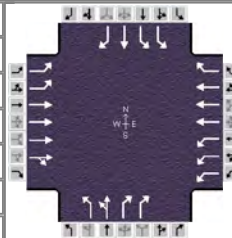
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	19.9	84.7	20.0	84.8		35.3		35.3
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		15.4			16.6		30.7
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		5.5		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.37		1.00

Movement Group Results	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Assigned Movement	1	6	16	5	2			4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1794	240	224	1546			0	346		0	987	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1291	1533	1707	1628			1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	58.6	20.2	13.4	28.1			0.0	14.6		0.0	28.7	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	58.6	20.2	13.4	28.1			0.0	14.6		0.0	28.7	
Green Ratio (g/C)	0.10	0.56	0.56	0.10	0.56			0.21	0.30		0.21	0.30	
Capacity (c), veh/h	172	2161	855	163	2727			390	801		390	1199	
Volume-to-Capacity Ratio (X)	0.006	0.830	0.281	1.370	0.567			0.000	0.432		0.000	0.823	
Available Capacity (c <sub>a</sub> ), veh/h	172	2161	855	163	2727			390	801		390	1199	
Back of Queue (Q), veh/ln (95th percentile)	0.1	24.4	12.4	22.3	15.3			0.0	8.4		0.0	16.5	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.49		0.00	0.54	
Uniform Delay (d <sub>1</sub> ), s/veh	62.7	37.0	36.5	59.6	19.3			0.0	39.3		0.0	45.6	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	1.8	0.4	195.6	0.7			0.0	0.4		0.0	4.8	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	62.7	38.8	36.9	255.2	20.0			0.0	39.7		0.0	50.3	
Level of Service (LOS)	E	D	D	F	B				D			D	
Approach Delay, s/veh / LOS	38.6		D	49.7		D		39.7		D	50.3		D
Intersection Delay, s/veh / LOS	44.8						D						

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.7	A	1.0	A	1.1	A	2.1	B

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 AM Peak_Traditional Widening.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	28	1062	59	400	1227	48	116	32	846	39	3	11

Signal Information														
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	26.4	18.2	15.5	20.9	26.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0				
				Red	3.0	3.0	3.0	3.0	3.0	0.0				

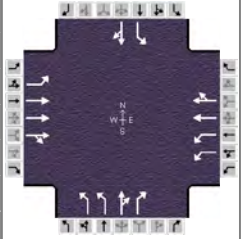
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	22.1	46.9	33.0	57.8		32.6		27.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	3.0		14.4			28.0		3.5
Green Extension Time (g <sub>e</sub> ), s	4.3	0.0	2.2	0.0		0.0		0.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.24		0.06			1.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	28	721	413	605	1855	73	126	35	920	42	3	12
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1031	1764	1723	1643	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	1.0	29.1	29.2	12.4	51.2	1.8	8.8	2.1	26.0	1.5	0.2	0.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.0	29.1	29.2	12.4	51.2	1.8	8.8	2.1	26.0	1.5	0.2	0.8
Green Ratio (g/C)	0.11	0.29	0.29	0.19	0.37	0.52	0.19	0.19	0.37	0.15	0.15	0.26
Capacity (c), veh/h	385	890	508	974	1803	813	326	349	1056	514	281	414
Volume-to-Capacity Ratio (X)	0.074	0.810	0.813	0.621	1.029	0.089	0.386	0.100	0.871	0.082	0.012	0.029
Available Capacity (c <sub>a</sub> ), veh/h	385	890	508	974	1803	813	326	349	1056	514	281	414
Back of Queue (Q), veh/ln (95th percentile)	0.8	11.7	19.2	7.0	27.2	0.6	7.1	1.8	22.1	1.2	0.2	0.6
Queue Storage Ratio (RQ) (95th percentile)	0.13	0.00	0.00	0.31	0.00	0.06	0.61	0.00	0.00	0.27	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	54.6	39.2	39.1	33.8	29.1	3.6	50.0	47.3	40.7	51.3	50.7	38.6
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	7.2	12.3	0.8	25.6	0.2	0.7	0.1	8.0	0.1	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	54.7	46.4	51.4	34.7	54.8	3.8	50.8	47.4	48.7	51.4	50.8	38.6
Level of Service (LOS)	D	D	D	C	F	A	D	D	D	D	D	D
Approach Delay, s/veh / LOS	48.4		D	48.5		D	48.9		D	48.7		D
Intersection Delay, s/veh / LOS	48.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.0	C	3.8	D	3.5	D
Bicycle LOS Score / LOS	1.0	A	1.5	A	2.3	B	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak_Traditional Widening.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	21	1050	39	41	1166	60	4	1	11	59	3	10

Signal Information				Phase Diagrams								
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	8.4	69.7	14.6	20.9	0.0	0.0						
Yellow	3.6	3.6	3.6	3.6	0.0	0.0						
Red	3.0	3.0	3.0	3.0	0.0	0.0						

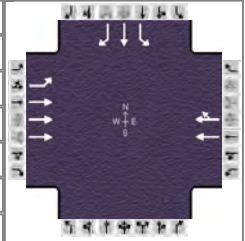
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	15.0	76.3	15.0	76.3	21.2	27.5	21.2	27.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.8		4.5		2.2	2.8	6.7	3.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.10		1.00		0.00	0.00	0.01	0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	22	755	371	63	940	938	4	1	12	64	14	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1758	1740	1792	1761	1740	1881	1594	1792	1652	
Queue Service Time (g <sub>s</sub> ), s	0.8	8.6	8.5	2.5	69.7	69.7	0.2	0.1	0.8	4.7	1.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.8	8.6	8.5	2.5	69.7	69.7	0.2	0.1	0.8	4.7	1.0	
Green Ratio (g/C)	0.56	0.50	0.50	0.06	0.50	0.50	0.10	0.15	0.21	0.10	0.15	
Capacity (c), veh/h	158	1785	875	209	892	877	363	281	334	187	247	
Volume-to-Capacity Ratio (X)	0.138	0.423	0.424	0.301	1.053	1.069	0.012	0.004	0.036	0.343	0.057	
Available Capacity (c <sub>a</sub> ), veh/h	158	1785	875	209	892	877	363	281	334	187	247	
Back of Queue (Q), veh/ln (95th percentile)	1.4	4.9	5.1	1.8	37.2	38.9	0.1	0.1	0.6	3.9	0.8	
Queue Storage Ratio (RQ) (95th percentile)	0.18	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.08	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	33.2	7.5	7.5	67.1	25.7	25.8	56.2	50.7	44.1	58.2	51.1	
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.7	1.4	0.1	28.5	35.0	0.0	0.0	0.0	1.1	0.1	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	33.6	8.2	8.9	67.2	54.1	60.8	56.2	50.7	44.1	59.3	51.2	
Level of Service (LOS)	C	A	A	E	F	F	E	D	D	E	D	
Approach Delay, s/veh / LOS	8.9		A	57.8		E	47.6		D	57.9		E
Intersection Delay, s/veh / LOS	40.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.5	A	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	54	1028			1082	67				47	0	40

Signal Information				Phase Diagram								
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	5.4	65.8	49.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
		Red	3.0	3.0	3.0	0.0	0.0	0.0				

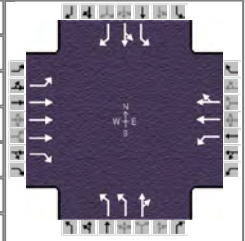
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.0	84.4		72.4				55.6
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.2
Queue Clearance Time (g <sub>s</sub> ), s	4.2							4.7
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	58	1097			853	845				51	0	43
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1755				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	2.2	6.2			40.3	65.8				2.7	0.0	2.6
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.2	6.2			40.3	65.8				2.7	0.0	2.6
Green Ratio (g/C)	0.52	0.56			0.47	0.47				0.35	0.35	0.35
Capacity (c), veh/h	121	2713			842	825				621	665	542
Volume-to-Capacity Ratio (X)	0.478	0.404			1.013	1.025				0.082	0.000	0.080
Available Capacity (c <sub>a</sub> ), veh/h	121	2713			842	825				621	665	542
Back of Queue (Q), veh/ln (95th percentile)	1.9	3.0			18.7	19.4				2.1	0.0	1.8
Queue Storage Ratio (RQ) (95th percentile)	0.36	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.2	4.3			15.7	15.7				30.5	0.0	30.4
Incremental Delay (d <sub>2</sub> ), s/veh	2.4	0.4			12.7	16.5				0.1	0.0	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.6	4.7			28.4	32.2				30.5	0.0	30.5
Level of Service (LOS)	D	A			F	F				C		C
Approach Delay, s/veh / LOS	6.3	A		30.3	C		0.0			30.5		C
Intersection Delay, s/veh / LOS	20.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.5	A			0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	42	1040	106	51	1016	133	31	8	17	5	0	6

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	10.4	58.5	19.2	25.5	0.0	0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	17.0	65.1	17.0	65.1		32.1		25.8
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.8		7.4			3.9		2.5
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.2		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.05		1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	46	1130	115	69	783	762	34	27		5	0	7
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1720	1740	1693		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	1.8	24.6	4.4	5.4	58.5	58.5	1.1	1.9		0.4	0.0	0.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.8	24.6	4.4	5.4	58.5	58.5	1.1	1.9		0.4	0.0	0.5
Green Ratio (g/C)	0.49	0.42	0.60	0.07	0.42	0.42	0.18	0.18		0.14	0.14	0.21
Capacity (c), veh/h	186	2040	957	133	749	719	634	308		248	261	337
Volume-to-Capacity Ratio (X)	0.246	0.554	0.120	0.515	1.046	1.061	0.053	0.088		0.022	0.000	0.019
Available Capacity (c <sub>a</sub> ), veh/h	186	2040	957	133	749	719	634	308		248	261	337
Back of Queue (Q), veh/ln (95th percentile)	1.5	14.9	2.9	3.4	21.6	21.9	0.9	1.4		0.3	0.0	0.3
Queue Storage Ratio (RQ) (95th percentile)	0.21	0.00	0.13	0.24	0.00	0.00	0.00	0.00		0.00	0.00	0.07
Uniform Delay (d <sub>1</sub> ), s/veh	30.7	30.9	12.1	67.4	18.2	17.8	47.3	47.6		52.3	0.0	43.7
Incremental Delay (d <sub>2</sub> ), s/veh	0.7	1.1	0.3	0.4	25.4	31.4	0.0	0.1		0.0	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	31.4	32.0	12.3	67.8	43.5	49.2	47.3	47.7		52.3	0.0	43.7
Level of Service (LOS)	C	C	B	E	F	F	D	D		D		D
Approach Delay, s/veh / LOS	30.2		C	47.3		D	47.5		D	47.6		D
Intersection Delay, s/veh / LOS	39.9						D					

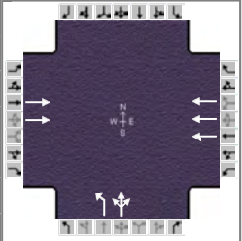
Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.4		B	2.4		B	3.2		C	3.1		C
Bicycle LOS Score / LOS	1.2		A	1.6		A	0.6		A	0.5		A

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**HCS Analysis – AM Peak Traditional Widening –  
Two Left Turn lanes at Howe Road**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening_2WBL.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		662			1362		266	0	116			

Signal Information												
Cycle, s	140.0	Reference Phase	2	←	←	←	←	←	←	←	←	←
Offset, s	0	Reference Point	End	Green	81.8	45.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

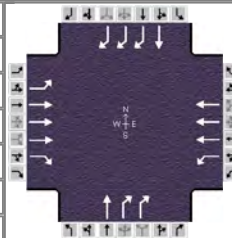
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		88.4		88.4		51.6		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						21.6		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.5		
Phase Call Probability						1.00		
Max Out Probability						0.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2140			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		81.8			25.3		19.6	19.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		81.8			25.3		19.6	19.6				
Green Ratio (g/C)		0.58			0.58		0.32	0.32				
Capacity (c), veh/h		2013			2853		544	544				
Volume-to-Capacity Ratio (X)		1.063			0.519		0.532	0.532				
Available Capacity (c <sub>a</sub> ), veh/h		2013			2853		544	544				
Back of Queue (Q), veh/ln (95th percentile)		16.1			14.5		13.0	13.0				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		3.1			17.4		38.9	38.9				
Incremental Delay (d <sub>2</sub> ), s/veh		35.1			0.7		1.0	1.0				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		38.2			18.0		39.9	39.9				
Level of Service (LOS)		F			B		D	D				
Approach Delay, s/veh / LOS	38.2		D	18.0		B	38.5		D	0.0		
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening_2WBL.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1717	230	107	739			0	318		0	908

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.2	57.9	13.4	29.1	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	19.8	84.3	20.0	84.5		35.7		35.7
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		15.4			16.5		31.1
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		5.6		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.35		1.00

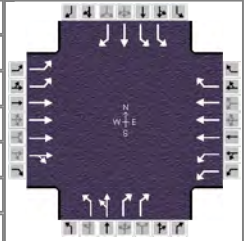
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2		4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1794	240	224	1546		0	346		0	987	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1291	1533	1707	1628		1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	58.8	20.2	13.4	28.2		0.0	14.5		0.0	29.1	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	58.8	20.2	13.4	28.2		0.0	14.5		0.0	29.1	
Green Ratio (g/C)	0.09	0.55	0.55	0.10	0.56		0.21	0.30		0.21	0.30	
Capacity (c), veh/h	171	2150	851	163	2717		395	809		395	1207	
Volume-to-Capacity Ratio (X)	0.006	0.835	0.282	1.370	0.569		0.000	0.427		0.000	0.818	
Available Capacity (c <sub>a</sub> ), veh/h	171	2150	851	163	2717		395	809		395	1207	
Back of Queue (Q), veh/ln (95th percentile)	0.1	24.6	12.5	22.3	15.4		0.0	8.4		0.0	16.4	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.49		0.00	0.54	
Uniform Delay (d <sub>1</sub> ), s/veh	62.7	37.4	36.8	59.6	19.3		0.0	39.0		0.0	45.3	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	1.9	0.4	195.6	0.7		0.0	0.4		0.0	4.5	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	62.8	39.3	37.2	255.2	20.1		0.0	39.4		0.0	49.8	
Level of Service (LOS)	E	D	D	F	C			D			D	
Approach Delay, s/veh / LOS	39.1		D	49.8		D	39.4		D	49.8		D
Intersection Delay, s/veh / LOS	44.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.7	A	1.0	A	1.1	A	2.1	B



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 AM Peak_Traditional Widening_2WBL.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	28	1062	59	400	1227	48	116	32	846	39	3	11

Signal Information				Signal Timing (s)								Signal Phases					
Cycle, s	140.0	Reference Phase	2	Green	26.4	18.8	15.4	20.5	25.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	3.6	3.6	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On														

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	22.0	47.4	33.0	58.4		32.5		27.1
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	3.0		25.1			27.9		3.5
Green Extension Time (g <sub>e</sub> ), s	4.3	0.0	0.4	0.0		0.0		0.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.24		1.00			1.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	28	721	413	605	1855	73	126	35	920	42	3	12
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1031	1764	1723	1643	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	1.0	28.6	28.7	23.1	51.8	1.7	8.8	2.1	25.9	1.5	0.2	0.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.0	28.6	28.7	23.1	51.8	1.7	8.8	2.1	25.9	1.5	0.2	0.8
Green Ratio (g/C)	0.11	0.29	0.29	0.19	0.37	0.52	0.19	0.19	0.37	0.15	0.15	0.26
Capacity (c), veh/h	383	901	514	650	1824	815	325	348	1054	504	275	409
Volume-to-Capacity Ratio (X)	0.074	0.800	0.803	0.931	1.017	0.089	0.388	0.100	0.872	0.084	0.012	0.029
Available Capacity (c <sub>a</sub> ), veh/h	383	901	514	650	1824	815	325	348	1054	504	275	409
Back of Queue (Q), veh/ln (95th percentile)	0.8	11.4	18.6	12.0	26.1	0.6	7.1	1.8	22.2	1.2	0.2	0.6
Queue Storage Ratio (RQ) (95th percentile)	0.13	0.00	0.00	0.53	0.00	0.06	0.61	0.00	0.00	0.27	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	54.5	37.4	37.4	35.4	28.0	3.4	50.1	47.4	40.7	51.6	51.1	39.0
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	6.8	11.6	15.4	22.0	0.1	0.8	0.1	8.2	0.1	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	54.6	44.2	48.9	50.9	50.0	3.5	50.8	47.5	48.9	51.7	51.1	39.0
Level of Service (LOS)	D	D	D	D	F	A	D	D	D	D	D	D
Approach Delay, s/veh / LOS	46.2		D	48.9		D	49.1		D	49.0		D
Intersection Delay, s/veh / LOS	48.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.8	D	3.5	D
Bicycle LOS Score / LOS	1.0	A	1.5	A	2.3	B	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 AM Peak_Traditional Widening_2WBL.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	21	1050	39	41	1166	60	4	1	11	59	3	10

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		8.4	70.4	14.3	20.5	0.0	0.0				
		Yellow		3.6	3.6	3.6	3.6	0.0	0.0				
		Red		3.0	3.0	3.0	3.0	0.0	0.0				

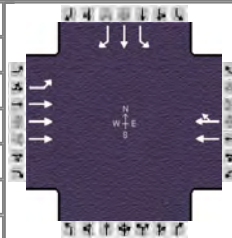
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	15.0	77.0	15.0	77.0	20.9	27.1	20.9	27.1
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.8		4.6		2.2	2.8	6.7	3.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.10		1.00		0.00	0.00	0.02	0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	22	755	371	63	950	948	4	1	12	64	14	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1758	1740	1792	1761	1740	1881	1594	1792	1652	
Queue Service Time (g <sub>s</sub> ), s	0.8	8.5	8.5	2.6	70.4	70.4	0.2	0.1	0.8	4.7	1.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.8	8.5	8.5	2.6	70.4	70.4	0.2	0.1	0.8	4.7	1.0	
Green Ratio (g/C)	0.56	0.50	0.50	0.06	0.50	0.50	0.10	0.15	0.21	0.10	0.15	
Capacity (c), veh/h	158	1803	884	209	901	886	355	275	329	183	242	
Volume-to-Capacity Ratio (X)	0.138	0.419	0.419	0.304	1.054	1.071	0.012	0.004	0.036	0.350	0.058	
Available Capacity (c <sub>a</sub> ), veh/h	158	1803	884	209	901	886	355	275	329	183	242	
Back of Queue (Q), veh/ln (95th percentile)	0.7	4.9	5.1	1.9	38.1	39.9	0.1	0.1	0.6	3.9	0.8	
Queue Storage Ratio (RQ) (95th percentile)	0.09	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.08	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	33.2	7.5	7.4	67.1	25.2	25.3	56.5	51.0	44.4	58.5	51.4	
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.7	1.4	0.1	29.4	36.1	0.0	0.0	0.0	1.1	0.1	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	33.6	8.1	8.7	67.2	54.6	61.4	56.5	51.0	44.5	59.7	51.5	
Level of Service (LOS)	C	A	A	E	F	F	E	D	D	E	D	
Approach Delay, s/veh / LOS	8.8		A	58.3		E	47.9		D	58.2		E
Intersection Delay, s/veh / LOS	40.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.5	A	0.6	A

## HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening_2WBL.xus				
Project Description					



Demand Information	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Demand (v), veh/h	54	1028			1082	67					47	0	40

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green	5.5	66.3	48.4	0.0	0.0	0.0					
		Yellow	3.6	3.6	3.6	0.0	0.0	0.0					
		Red	3.0	3.0	3.0	0.0	0.0	0.0					

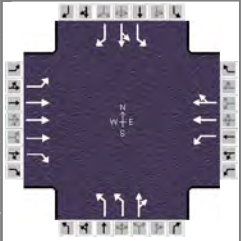
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.1	85.0		72.9				55.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.2
Queue Clearance Time (g <sub>s</sub> ), s	4.2							4.7
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	58	1097			862	854				51	0	43
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1755				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	2.2	6.0			40.0	66.3				2.7	0.0	2.6
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.2	6.0			40.0	66.3				2.7	0.0	2.6
Green Ratio (g/C)	0.53	0.56			0.47	0.47				0.35	0.35	0.35
Capacity (c), veh/h	122	2734			849	831				613	657	535
Volume-to-Capacity Ratio (X)	0.473	0.401			1.015	1.027				0.083	0.000	0.081
Available Capacity (c <sub>a</sub> ), veh/h	122	2734			849	831				613	657	535
Back of Queue (Q), veh/ln (95th percentile)	1.9	2.9			19.2	20.0				2.1	0.0	1.8
Queue Storage Ratio (RQ) (95th percentile)	0.36	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.2	4.2			15.7	15.7				30.9	0.0	30.8
Incremental Delay (d <sub>2</sub> ), s/veh	2.3	0.4			13.3	17.4				0.1	0.0	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.5	4.5			29.0	33.1				30.9	0.0	30.9
Level of Service (LOS)	D	A			F	F				C		C
Approach Delay, s/veh / LOS	6.1		A	31.0		C	0.0			30.9		C
Intersection Delay, s/veh / LOS	21.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.5	A			0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening_2WBL.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	42	1040	106	51	1016	133	31	8	17	5	0	6

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	10.4	58.8	19.1	25.3	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	17.0	65.4	17.0	65.4		31.9		25.7
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.8		7.4			3.9		2.5
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.2		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.05		1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	46	1130	115	69	789	768	34	27		5	0	7
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1720	1740	1693		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	1.8	24.5	4.4	5.4	58.8	58.8	1.1	1.9		0.4	0.0	0.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.8	24.5	4.4	5.4	58.8	58.8	1.1	1.9		0.4	0.0	0.5
Green Ratio (g/C)	0.49	0.42	0.60	0.07	0.42	0.42	0.18	0.18		0.14	0.14	0.21
Capacity (c), veh/h	186	2051	958	133	753	722	629	306		247	259	336
Volume-to-Capacity Ratio (X)	0.246	0.551	0.120	0.519	1.048	1.064	0.054	0.089		0.022	0.000	0.019
Available Capacity (c <sub>a</sub> ), veh/h	186	2051	958	133	753	722	629	306		247	259	336
Back of Queue (Q), veh/ln (95th percentile)	2.8	14.9	2.9	3.4	21.9	22.3	0.9	1.4		0.3	0.0	0.3
Queue Storage Ratio (RQ) (95th percentile)	0.40	0.00	0.13	0.23	0.00	0.00	0.00	0.00		0.00	0.00	0.07
Uniform Delay (d <sub>1</sub> ), s/veh	30.7	30.6	12.0	67.4	18.2	17.8	47.4	47.8		52.4	0.0	43.8
Incremental Delay (d <sub>2</sub> ), s/veh	0.7	1.1	0.3	0.4	25.9	32.3	0.0	0.1		0.0	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	31.4	31.7	12.3	67.8	44.1	50.1	47.5	47.9		52.4	0.0	43.8
Level of Service (LOS)	C	C	B	E	F	F	D	D		D		D
Approach Delay, s/veh / LOS	30.0		C	47.9		D	47.7		D	47.7		D
Intersection Delay, s/veh / LOS	40.2						D					

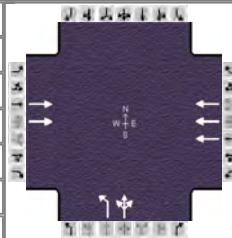
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.6	A	0.5	A



## **HCS Analysis – No Build PM Peak**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1665			1260		327	0	170			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	94.7	32.1	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	0.0	0.0	0.0	0.0				
		Red	3.0	3.0	0.0	0.0	0.0	0.0				

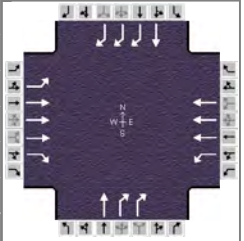
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		101.3		101.3		38.7		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						30.7		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.4		
Phase Call Probability						1.00		
Max Out Probability						1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2628			1370		355	355				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		94.7			17.7		28.7	28.7				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		94.7			17.7		28.7	28.7				
Green Ratio (g/C)		0.68			0.68		0.23	0.23				
Capacity (c), veh/h		2331			3303		388	388				
Volume-to-Capacity Ratio (X)		1.128			0.415		0.917	0.917				
Available Capacity (c <sub>a</sub> ), veh/h		2331			3303		388	388				
Back of Queue (Q), veh/ln (95th percentile)		35.8			10.2		21.2	21.2				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		8.8			10.2		52.6	52.6				
Incremental Delay (d <sub>2</sub> ), s/veh		59.5			0.4		26.1	26.1				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		68.3			10.6		78.8	78.8				
Level of Service (LOS)		F			B		E	E				
Approach Delay, s/veh / LOS	68.3	E		10.6	B		68.3	E		0.0		
Intersection Delay, s/veh / LOS	50.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.2	A	1.4	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014		Area Type	Other	
Jurisdiction	ODOT District 12		Time Period	AM Peak		PHF	0.92
Intersection	I-71 SB Ramps		Analysis Year	2014		Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus						
Project Description	PM Peak Original						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1850	381	85	1188			0	701		0	1779

Signal Information				Phase Diagram								
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	5.4	41.0	9.4	57.8	0.0	0.0						
Yellow	3.6	3.6	3.6	3.6	0.0	0.0						
Red	3.0	3.0	3.0	3.0	0.0	0.0						

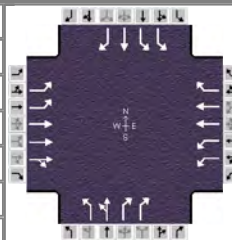
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	12.0	59.6	16.0	63.6		64.4		64.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		11.4			31.2		59.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		18.6		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			0.57		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2			4	14		8	18
Adjusted Flow Rate (v), veh/h	1	1912	394	115	1610			0	762		0	1934
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1643	1533	1707	1628			1900	1332		1900	1332
Queue Service Time (g <sub>s</sub> ), s	0.1	53.0	35.7	9.4	40.4			0.0	29.2		0.0	57.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	53.0	35.7	9.4	40.4			0.0	29.2		0.0	57.8
Green Ratio (g/C)	0.04	0.38	0.38	0.07	0.41			0.41	0.48		0.41	0.45
Capacity (c), veh/h	70	1866	581	115	1988			784	1279		784	1804
Volume-to-Capacity Ratio (X)	0.015	1.025	0.678	1.005	0.810			0.000	0.596		0.000	1.072
Available Capacity (c <sub>a</sub> ), veh/h	70	1866	581	115	1988			784	1279		784	1804
Back of Queue (Q), veh/ln (95th percentile)	0.1	33.3	23.6	10.3	22.2			0.0	9.7		0.0	37.6
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.57		0.00	1.24
Uniform Delay (d <sub>1</sub> ), s/veh	65.3	64.3	60.3	63.8	35.3			0.0	26.5		0.0	38.4
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	20.2	2.6	78.5	3.1			0.0	0.8		0.0	43.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Control Delay (d), s/veh	65.3	84.4	62.9	142.3	38.4			0.0	27.3		0.0	81.9
Level of Service (LOS)	E	F	E	F	D			C				F
Approach Delay, s/veh / LOS	80.8 / F			45.4 / D			27.3 / C			81.9 / F		
Intersection Delay, s/veh / LOS	66.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.8	A	1.2	A	1.7	A	3.7	D

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	191	1412	77	867	1779	321	170	102	597	222	140	242

Signal Information				Signal Timing Diagram								
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	43.9	23.9	8.4	15.4	15.4	0.0						
Yellow	3.6	3.6	3.6	3.6	3.6	0.0						
Red	3.0	3.0	3.0	3.0	3.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	15.0	45.5	50.5	81.0		22.0		22.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	9.9		41.9			17.4		17.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

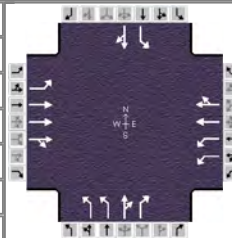
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	197	1032	502	997	2047	369	185	111	649	241	152	263
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1810	1759	1723	1723	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	7.9	38.9	38.9	39.9	74.4	9.8	14.6	7.8	15.4	9.4	11.0	15.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	7.9	38.9	38.9	39.9	74.4	9.8	14.6	7.8	15.4	9.4	11.0	15.4
Green Ratio (g/C)	0.06	0.28	0.28	0.31	0.53	0.64	0.11	0.11	0.42	0.11	0.11	0.17
Capacity (c), veh/h	209	1006	489	1080	1831	1013	193	207	1195	379	207	271
Volume-to-Capacity Ratio (X)	0.943	1.027	1.027	0.923	1.118	0.365	0.956	0.536	0.543	0.637	0.735	0.971
Available Capacity (c <sub>a</sub> ), veh/h	209	1006	489	1080	1831	1013	193	207	1195	379	207	271
Back of Queue (Q), veh/ln (95th percentile)	7.6	21.9	22.6	21.7	51.0	1.8	14.3	7.0	12.9	7.7	10.0	13.9
Queue Storage Ratio (RQ) (95th percentile)	1.27	0.00	0.00	0.97	0.00	0.18	1.22	0.00	0.00	1.77	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	66.3	29.2	28.4	55.8	27.9	7.2	62.0	58.9	30.2	59.6	60.3	57.8
Incremental Delay (d <sub>2</sub> ), s/veh	37.4	31.0	41.3	3.2	54.8	0.2	52.0	2.7	0.5	3.5	12.8	46.4
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	103.7	60.2	69.7	59.0	82.7	7.4	114.0	61.6	30.7	63.1	73.1	104.1
Level of Service (LOS)	F	F	F	E	F	A	F	E	C	E	E	F
Approach Delay, s/veh / LOS	67.9	E		67.7	E		50.6	D		81.9	F	
Intersection Delay, s/veh / LOS	66.7						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	3.1	C	2.0	B	1.6	A



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	36	1227	52	328	1414	58	95	7	257	102	18	31

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	13.4	8.4	54.2	10.6	3.2	10.6			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	3.6	3.6			
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	3.0	3.0			

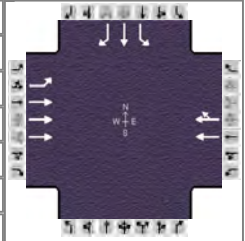
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	20.0	60.8	35.0	75.8	17.2	17.2	27.0	27.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.7		18.4		6.0	12.6	9.9	5.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.3	0.0	0.1	0.0	0.2	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.06		0.58	1.00	0.00	0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	39	939	459	415	933	931	103	8	279	111	53	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1753	1740	1792	1767	1740	1881	1594	1792	1689	
Queue Service Time (g <sub>s</sub> ), s	1.7	31.4	31.3	16.4	69.2	69.2	4.0	0.5	10.6	7.9	3.9	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.7	31.4	31.3	16.4	69.2	69.2	4.0	0.5	10.6	7.9	3.9	
Green Ratio (g/C)	0.48	0.39	0.39	0.20	0.49	0.49	0.08	0.08	0.28	0.15	0.15	
Capacity (c), veh/h	221	1388	679	706	886	874	263	142	444	261	246	
Volume-to-Capacity Ratio (X)	0.178	0.676	0.676	0.588	1.053	1.065	0.392	0.053	0.629	0.425	0.216	
Available Capacity (c <sub>a</sub> ), veh/h	221	1388	679	706	886	874	263	142	444	261	246	
Back of Queue (Q), veh/ln (95th percentile)	1.3	20.4	20.5	9.2	35.8	36.8	3.2	0.5	13.7	6.6	3.0	
Queue Storage Ratio (RQ) (95th percentile)	0.17	0.00	0.00	0.40	0.00	0.00	0.44	0.00	1.86	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	30.8	38.6	38.4	61.6	25.5	25.2	61.6	60.0	44.2	54.5	52.8	
Incremental Delay (d <sub>2</sub> ), s/veh	0.3	2.5	4.9	0.1	27.0	32.2	0.9	0.2	2.8	1.1	0.4	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	31.2	41.0	43.4	61.7	52.5	57.3	62.6	60.2	47.0	55.6	53.2	
Level of Service (LOS)	C	D	D	E	F	F	E	E	D	E	D	
Approach Delay, s/veh / LOS	41.5		D	56.1		E	51.4		D	54.8		D
Intersection Delay, s/veh / LOS	50.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.3	A	2.1	B	1.1	A	0.8	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Demand (v), veh/h	89	1172			1445	112					99	0	124

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	16.9	68.4	34.9	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0			
				Red	3.0	3.0	3.0	0.0	0.0	0.0			

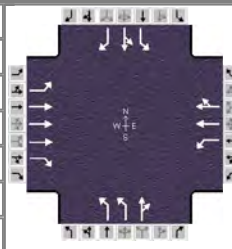
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	23.5	98.5		75.0				41.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.3
Queue Clearance Time (g <sub>s</sub> ), s	5.6							12.0
Green Extension Time (g <sub>e</sub> ), s	0.2	0.0		0.0				0.8
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	101	1329			917	911				108	0	135
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1747				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	3.6	19.1			65.5	68.4				6.8	0.0	10.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s	3.6	19.1			65.5	68.4				6.8	0.0	10.0
Green Ratio (g/C)	0.62	0.66			0.49	0.49				0.25	0.25	0.25
Capacity (c), veh/h	268	3205			876	854				442	474	386
Volume-to-Capacity Ratio (X)	0.377	0.415			1.047	1.067				0.243	0.000	0.349
Available Capacity (c <sub>a</sub> ), veh/h	268	3205			876	854				442	474	386
Back of Queue (Q), veh/ln (95th percentile)	3.3	9.8			29.7	31.3				5.4	0.0	7.0
Queue Storage Ratio (RQ) (95th percentile)	0.64	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	32.9	12.5			19.9	19.5				42.0	0.0	43.2
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.2			24.5	33.1				0.3	0.0	0.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	33.3	12.6			44.4	52.6				42.3	0.0	43.8
Level of Service (LOS)	C	B			F	F				D		D
Approach Delay, s/veh / LOS	14.1	B		48.5	D		0.0			43.1		D
Intersection Delay, s/veh / LOS	34.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.9	A			0.9	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information				Signal Timing (s)																				
Cycle, s	140.0	Reference Phase	2	Green	8.4	18.4	37.4	17.4	25.4	0.0	Yellow	3.6	3.6	3.6	3.6	3.6	0.0	Red	3.0	3.0	3.0	3.0	3.0	0.0
Offset, s	0	Reference Point	End																					
Uncoordinated	No	Simult. Gap E/W	On																					
Force Mode	Fixed	Simult. Gap N/S	On																					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	15.0	44.0	40.0	69.0		32.0		24.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		13.4			18.4		8.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.5		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		0.00			0.37		0.03

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	158	792	791	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	32.4	37.4	11.4	60.6	60.7	16.4	12.9		6.8	0.8	3.7
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	32.4	37.4	11.4	60.6	60.7	16.4	12.9		6.8	0.8	3.7
Green Ratio (g/C)	0.33	0.27	0.45	0.24	0.45	0.45	0.18	0.18		0.12	0.12	0.18
Capacity (c), veh/h	160	1304	715	427	799	798	631	292		225	236	294
Volume-to-Capacity Ratio (X)	0.034	0.899	0.848	0.370	0.991	0.991	0.689	0.558		0.425	0.051	0.170
Available Capacity (c <sub>a</sub> ), veh/h	160	1304	715	427	799	798	631	292		225	236	294
Back of Queue (Q), veh/ln (95th percentile)	0.2	20.5	27.7	6.5	22.2	22.2	11.9	9.2		5.8	0.7	2.7
Queue Storage Ratio (RQ) (95th percentile)	0.03	0.00	1.25	0.45	0.00	0.00	0.00	0.00		0.00	0.00	0.57
Uniform Delay (d <sub>1</sub> ), s/veh	36.8	49.5	34.4	51.9	21.6	21.6	53.6	52.2		56.7	54.0	48.1
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	10.1	12.0	0.0	7.7	7.7	3.2	2.3		1.3	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	36.9	59.6	46.3	52.0	29.3	29.3	56.8	54.5		58.0	54.1	48.4
Level of Service (LOS)	D	E	D	D	C	C	E	D		E	D	D
Approach Delay, s/veh / LOS	55.0		D	31.4		C	56.2		E	54.6		D
Intersection Delay, s/veh / LOS	45.5						D					

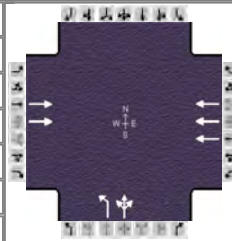
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A



## **HCS Analysis – PM Peak Proposed**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1665			1260		327	0	170			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	94.7	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

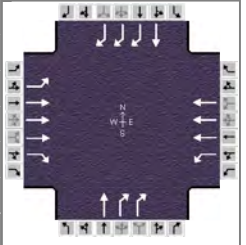
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		101.3		101.3		38.7		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						30.7		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.4		
Phase Call Probability						1.00		
Max Out Probability						1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2628			1370		355	355				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		94.7			17.7		28.7	28.7				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		94.7			17.7		28.7	28.7				
Green Ratio (g/C)		0.68			0.68		0.23	0.23				
Capacity (c), veh/h		2331			3303		388	388				
Volume-to-Capacity Ratio (X)		1.128			0.415		0.917	0.917				
Available Capacity (c <sub>a</sub> ), veh/h		2331			3303		388	388				
Back of Queue (Q), veh/ln (95th percentile)		35.8			10.2		21.2	21.2				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		8.8			10.2		52.6	52.6				
Incremental Delay (d <sub>2</sub> ), s/veh		59.5			0.4		26.1	26.1				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		68.3			10.6		78.8	78.8				
Level of Service (LOS)		F			B		E	E				
Approach Delay, s/veh / LOS	68.3	E		10.6	B		68.3	E		0.0		
Intersection Delay, s/veh / LOS	50.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.2	A	1.4	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1850	381	85	1188			0	701		0	1779

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	5.4	41.0	9.4	57.8	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

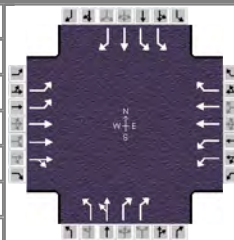
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	12.0	59.6	16.0	63.6		64.4		64.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		11.4			31.2		59.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		18.6		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			0.57		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2		4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1912	394	115	1610		0	762		0	1934	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1643	1533	1707	1628		1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	53.0	35.7	9.4	40.4		0.0	29.2		0.0	57.8	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	53.0	35.7	9.4	40.4		0.0	29.2		0.0	57.8	
Green Ratio (g/C)	0.04	0.38	0.38	0.07	0.41		0.41	0.48		0.41	0.45	
Capacity (c), veh/h	70	1866	581	115	1988		784	1279		784	1804	
Volume-to-Capacity Ratio (X)	0.015	1.025	0.678	1.005	0.810		0.000	0.596		0.000	1.072	
Available Capacity (c <sub>a</sub> ), veh/h	70	1866	581	115	1988		784	1279		784	1804	
Back of Queue (Q), veh/ln (95th percentile)	0.1	33.3	23.6	10.3	22.2		0.0	9.7		0.0	37.6	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.57		0.00	1.24	
Uniform Delay (d <sub>1</sub> ), s/veh	65.3	64.3	60.3	63.8	35.3		0.0	26.5		0.0	38.4	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	20.2	2.6	78.5	3.1		0.0	0.8		0.0	43.5	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	65.3	84.4	62.9	142.3	38.4		0.0	27.3		0.0	81.9	
Level of Service (LOS)	E	F	E	F	D			C			F	
Approach Delay, s/veh / LOS	80.8		F	45.4		D	27.3		C	81.9		F
Intersection Delay, s/veh / LOS	66.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.8	A	1.2	A	1.7	A	3.7	D

## HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	191	1412	77	867	1779	321	170	102	597	222	140	242

Signal Information														
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	43.9	23.9	8.4	15.4	15.4	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0				
				Red	3.0	3.0	3.0	3.0	3.0	0.0				

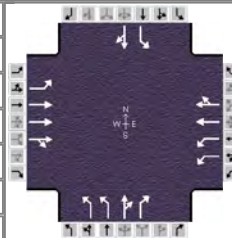
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	15.0	45.5	50.5	81.0		22.0		22.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	9.9		41.9			17.4		17.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	197	1032	502	997	2047	369	185	111	649	241	152	263
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1810	1759	1723	1723	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	7.9	38.9	38.9	39.9	74.4	9.8	14.6	7.8	15.4	9.4	11.0	15.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	7.9	38.9	38.9	39.9	74.4	9.8	14.6	7.8	15.4	9.4	11.0	15.4
Green Ratio (g/C)	0.06	0.28	0.28	0.31	0.53	0.64	0.11	0.11	0.42	0.11	0.11	0.17
Capacity (c), veh/h	209	1006	489	1080	1831	1013	193	207	1195	379	207	271
Volume-to-Capacity Ratio (X)	0.943	1.027	1.027	0.923	1.118	0.365	0.956	0.536	0.543	0.637	0.735	0.971
Available Capacity (c <sub>a</sub> ), veh/h	209	1006	489	1080	1831	1013	193	207	1195	379	207	271
Back of Queue (Q), veh/ln (95th percentile)	7.6	21.9	22.6	21.7	51.0	1.8	14.3	7.0	12.9	7.7	10.0	13.9
Queue Storage Ratio (RQ) (95th percentile)	1.27	0.00	0.00	0.97	0.00	0.18	1.22	0.00	0.00	1.77	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	66.3	29.2	28.4	55.8	27.9	7.2	62.0	58.9	30.2	59.6	60.3	57.8
Incremental Delay (d <sub>2</sub> ), s/veh	37.4	31.0	41.3	3.2	54.8	0.2	52.0	2.7	0.5	3.5	12.8	46.4
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	103.7	60.2	69.7	59.0	82.7	7.4	114.0	61.6	30.7	63.1	73.1	104.1
Level of Service (LOS)	F	F	F	E	F	A	F	E	C	E	E	F
Approach Delay, s/veh / LOS	67.9	E		67.7	E		50.6	D		81.9	F	
Intersection Delay, s/veh / LOS	66.7						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	3.1	C	2.0	B	1.6	A

## HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	36	1227	52	328	1414	58	95	7	257	102	18	31

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.4	8.4	54.2	10.6	3.2	10.6			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	3.6			
				Red	3.0	3.0	3.0	3.0	3.0	3.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	20.0	60.8	35.0	75.8	17.2	17.2	27.0	27.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.7		18.4		6.0	12.6	9.9	5.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.3	0.0	0.1	0.0	0.2	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.06		0.58	1.00	0.00	0.01

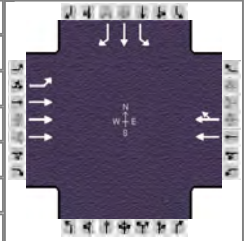
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	39	939	459	415	933	931	103	8	279	111	53	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1753	1740	1792	1767	1740	1881	1594	1792	1689	
Queue Service Time (g <sub>s</sub> ), s	1.7	31.4	31.3	16.4	69.2	69.2	4.0	0.5	10.6	7.9	3.9	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.7	31.4	31.3	16.4	69.2	69.2	4.0	0.5	10.6	7.9	3.9	
Green Ratio (g/C)	0.48	0.39	0.39	0.20	0.49	0.49	0.08	0.08	0.28	0.15	0.15	
Capacity (c), veh/h	221	1388	679	706	886	874	263	142	444	261	246	
Volume-to-Capacity Ratio (X)	0.178	0.676	0.676	0.588	1.053	1.065	0.392	0.053	0.629	0.425	0.216	
Available Capacity (c <sub>a</sub> ), veh/h	221	1388	679	706	886	874	263	142	444	261	246	
Back of Queue (Q), veh/ln (95th percentile)	1.3	20.4	20.5	9.2	35.8	36.8	3.2	0.5	13.7	6.6	3.0	
Queue Storage Ratio (RQ) (95th percentile)	0.17	0.00	0.00	0.40	0.00	0.00	0.44	0.00	1.86	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	30.8	38.6	38.4	61.6	25.5	25.2	61.6	60.0	44.2	54.5	52.8	
Incremental Delay (d <sub>2</sub> ), s/veh	0.3	2.5	4.9	0.1	27.0	32.2	0.9	0.2	2.8	1.1	0.4	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	31.2	41.0	43.4	61.7	52.5	57.3	62.6	60.2	47.0	55.6	53.2	
Level of Service (LOS)	C	D	D	E	F	F	E	E	D	E	D	
Approach Delay, s/veh / LOS	41.5		D	56.1		E	51.4		D	54.8		D
Intersection Delay, s/veh / LOS	50.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.3	A	2.1	B	1.1	A	0.8	A



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	89	1172			1445	112				99	0	124

Signal Information														
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	16.9	68.4	34.9	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
				Red	3.0	3.0	3.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	23.5	98.5		75.0				41.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.3
Queue Clearance Time (g <sub>s</sub> ), s	5.6							12.0
Green Extension Time (g <sub>e</sub> ), s	0.2	0.0		0.0				0.8
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	101	1329			917	911				108	0	135
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1747				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	3.6	19.1			65.5	68.4				6.8	0.0	10.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s	3.6	19.1			65.5	68.4				6.8	0.0	10.0
Green Ratio (g/C)	0.62	0.66			0.49	0.49				0.25	0.25	0.25
Capacity (c), veh/h	268	3205			876	854				442	474	386
Volume-to-Capacity Ratio (X)	0.377	0.415			1.047	1.067				0.243	0.000	0.349
Available Capacity (c <sub>a</sub> ), veh/h	268	3205			876	854				442	474	386
Back of Queue (Q), veh/ln (95th percentile)	3.3	9.8			29.7	31.3				5.4	0.0	7.0
Queue Storage Ratio (RQ) (95th percentile)	0.64	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	32.9	12.5			19.9	19.5				42.0	0.0	43.2
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.2			24.5	33.1				0.3	0.0	0.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	33.3	12.6			44.4	52.6				42.3	0.0	43.8
Level of Service (LOS)	C	B			F	F				D		D
Approach Delay, s/veh / LOS	14.1	B		48.5	D		0.0			43.1		D
Intersection Delay, s/veh / LOS	34.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.9	A			0.9	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2	Green		Yellow		Red		Phase 1		Phase 2	
Offset, s	0	Reference Point	End	8.4	18.4	3.6	3.6	3.0	3.0	0.0			
Uncoordinated	No	Simult. Gap E/W	On	3.6	3.6	3.6	3.6	3.6	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	3.0	3.0	3.0	3.0	3.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	15.0	44.0	40.0	69.0		32.0		24.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		13.4			18.4		8.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.5		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		0.00			0.37		0.03

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	158	792	791	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	32.4	37.4	11.4	60.6	60.7	16.4	12.9		6.8	0.8	3.7
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	32.4	37.4	11.4	60.6	60.7	16.4	12.9		6.8	0.8	3.7
Green Ratio (g/C)	0.33	0.27	0.45	0.24	0.45	0.45	0.18	0.18		0.12	0.12	0.18
Capacity (c), veh/h	160	1304	715	427	799	798	631	292		225	236	294
Volume-to-Capacity Ratio (X)	0.034	0.899	0.848	0.370	0.991	0.991	0.689	0.558		0.425	0.051	0.170
Available Capacity (c <sub>a</sub> ), veh/h	160	1304	715	427	799	798	631	292		225	236	294
Back of Queue (Q), veh/ln (95th percentile)	0.2	20.5	27.7	6.5	22.2	22.2	11.9	9.2		5.8	0.7	2.7
Queue Storage Ratio (RQ) (95th percentile)	0.03	0.00	1.25	0.45	0.00	0.00	0.00	0.00		0.00	0.00	0.57
Uniform Delay (d <sub>1</sub> ), s/veh	36.8	49.5	34.4	51.9	21.6	21.6	53.6	52.2		56.7	54.0	48.1
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	10.1	12.0	0.0	7.7	7.7	3.2	2.3		1.3	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	36.9	59.6	46.3	52.0	29.3	29.3	56.8	54.5		58.0	54.1	48.4
Level of Service (LOS)	D	E	D	D	C	C	E	D		E	D	D
Approach Delay, s/veh / LOS	55.0		D	31.4		C	56.2		E	54.6		D
Intersection Delay, s/veh / LOS	45.5						D					

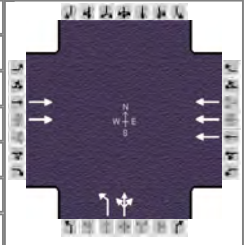
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A



## **HCS Analysis – PM Peak Proposed with U-Turns**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed_Uturns.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1665			1260		327	0	170			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	94.1	32.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

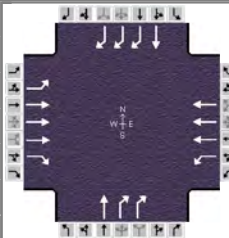
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		100.7		100.7		39.3		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						30.6		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.5		
Phase Call Probability						1.00		
Max Out Probability						1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2586			1370		355	355				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		94.1			17.9		28.6	28.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		94.1			17.9		28.6	28.6				
Green Ratio (g/C)		0.67			0.67		0.23	0.23				
Capacity (c), veh/h		2316			3282		395	395				
Volume-to-Capacity Ratio (X)		1.117			0.417		0.900	0.900				
Available Capacity (c <sub>a</sub> ), veh/h		2316			3282		395	395				
Back of Queue (Q), veh/ln (95th percentile)		40.3			10.3		20.8	20.8				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		10.2			10.5		52.1	52.1				
Incremental Delay (d <sub>2</sub> ), s/veh		54.8			0.4		22.9	22.9				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		65.0			10.8		74.9	74.9				
Level of Service (LOS)		F			B		E	E				
Approach Delay, s/veh / LOS	65.0	E		10.8	B		65.5	E		0.0		
Intersection Delay, s/veh / LOS	48.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.2	A	1.4	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed_Uturns.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1850	381	85	1188			0	701		0	1779

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	7.9	37.3	8.3	60.1	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

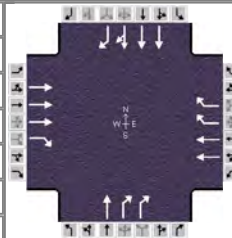
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	14.5	58.4	14.9	58.8		66.7		66.7
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		10.3			30.7		62.1
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		19.9		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		1.00			0.53		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2		4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1854	382	115	1610		0	762		0	1934	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1643	1533	1707	1628		1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	51.8	25.7	8.3	42.9		0.0	28.7		0.0	60.1	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	51.8	25.7	8.3	42.9		0.0	28.7		0.0	60.1	
Green Ratio (g/C)	0.06	0.37	0.37	0.06	0.37		0.43	0.49		0.43	0.49	
Capacity (c), veh/h	102	1824	567	101	1821		816	1301		816	1941	
Volume-to-Capacity Ratio (X)	0.010	1.016	0.673	1.138	0.884		0.000	0.586		0.000	0.996	
Available Capacity (c <sub>a</sub> ), veh/h	102	1824	567	101	1821		816	1301		816	1941	
Back of Queue (Q), veh/ln (95th percentile)	0.1	29.6	12.6	11.5	24.0		0.0	10.0		0.0	32.7	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.59		0.00	1.08	
Uniform Delay (d <sub>1</sub> ), s/veh	61.0	36.6	27.3	64.4	39.6		0.0	25.6		0.0	35.9	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	21.9	4.5	124.1	5.7		0.0	0.7		0.0	19.6	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	61.0	58.5	31.8	188.6	45.4		0.0	26.3		0.0	55.4	
Level of Service (LOS)	E	F	C	F	D			C			E	
Approach Delay, s/veh / LOS	53.9		D	55.0		D	26.3		C	55.4		E
Intersection Delay, s/veh / LOS	51.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.8	A	1.2	A	1.7	A	3.7	D

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed_Uturns.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1603	77		1779	321		102	597		362	242

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green		97.8	29.0	0.0	0.0	0.0	0.0				
		Yellow		3.6	3.6	0.0	0.0	0.0	0.0				
		Red		3.0	3.0	0.0	0.0	0.0	0.0				

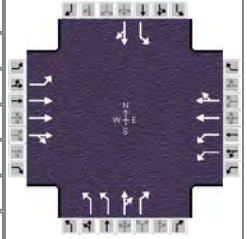
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		8
Case Number		7.0		7.0		7.0		7.0
Phase Duration, s		104.4		104.4		35.6		35.6
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		6.6
Max Allow Headway (MAH), s		0.0		0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s						31.0		23.9
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.0		2.9
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		0.90

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6	16		2	12		4	14		8	18
Adjusted Flow Rate (v), veh/h		1652	79		3002	542		111	649		393	263
Adjusted Saturation Flow Rate (s), veh/h/ln		1643	1610		1723	1397		1881	1411		1881	1594
Queue Service Time (g <sub>s</sub> ), s		15.4	1.4		97.8	10.8		7.0	29.0		8.3	21.9
Cycle Queue Clearance Time (g <sub>c</sub> ), s		15.4	1.4		97.8	10.8		7.0	29.0		8.3	21.9
Green Ratio (g/C)		0.70	0.70		0.70	0.70		0.21	0.21		0.21	0.21
Capacity (c), veh/h		3443	1125		2407	1952		390	585		1169	330
Volume-to-Capacity Ratio (X)		0.480	0.071		1.247	0.278		0.285	1.110		0.337	0.797
Available Capacity (c <sub>a</sub> ), veh/h		3443	1125		2407	1952		390	585		1169	330
Back of Queue (Q), veh/ln (95th percentile)		7.0	0.8		94.4	4.5		6.0	23.8		7.1	15.1
Queue Storage Ratio (RQ) (95th percentile)		0.00	0.00		0.00	0.46		0.00	0.00		0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh		5.8	4.1		20.4	8.5		46.8	55.5		47.3	52.7
Incremental Delay (d <sub>2</sub> ), s/veh		0.3	0.1		112.1	0.1		0.4	71.2		0.2	12.8
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Control Delay (d), s/veh		6.2	4.1		132.5	8.6		47.2	126.7		47.5	65.5
Level of Service (LOS)		A	A		F	A		D	F		D	E
Approach Delay, s/veh / LOS	6.1	A		113.6	F		115.1	F			54.7	D
Intersection Delay, s/veh / LOS	80.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.5	A	2.4	B	1.7	A	0.8	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 PM Peak_Proposed_Uturns.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	36	1227	52	328	1414	58	95	7	257	102	18	31

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	5.4	19.4	52.4	13.4	3.0	13.4			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	3.6			
				Red	3.0	3.0	3.0	3.0	0.0	3.0			

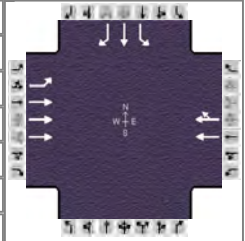
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	12.0	59.0	38.0	85.0	20.0	20.0	23.0	23.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.9		20.1		5.9	15.4	10.2	6.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.6	0.0	0.2	0.0	0.1	1.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.04		0.03	1.00	0.14	0.06

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	39	939	459	487	1092	1092	103	8	279	111	53	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1753	1740	1792	1767	1740	1881	1594	1792	1689	
Queue Service Time (g <sub>s</sub> ), s	1.9	31.2	31.1	18.1	78.4	78.4	3.9	0.5	13.4	8.2	4.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.9	31.2	31.1	18.1	78.4	78.4	3.9	0.5	13.4	8.2	4.0	
Green Ratio (g/C)	0.41	0.37	0.37	0.22	0.56	0.56	0.10	0.10	0.32	0.12	0.12	
Capacity (c), veh/h	120	1342	656	780	1004	990	333	180	510	210	198	
Volume-to-Capacity Ratio (X)	0.328	0.700	0.700	0.623	1.088	1.103	0.310	0.042	0.548	0.528	0.269	
Available Capacity (c <sub>a</sub> ), veh/h	120	1342	656	780	1004	990	333	180	510	210	198	
Back of Queue (Q), veh/ln (95th percentile)	1.6	20.0	20.3	9.4	39.8	41.7	3.1	0.4	12.7	6.9	3.2	
Queue Storage Ratio (RQ) (95th percentile)	0.20	0.00	0.00	0.41	0.00	0.00	0.42	0.00	1.73	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	35.9	37.4	37.3	51.7	17.5	17.4	59.0	57.5	39.2	58.2	56.3	
Incremental Delay (d <sub>2</sub> ), s/veh	1.5	2.8	5.7	0.1	41.3	48.0	0.5	0.1	1.2	2.5	0.7	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	37.3	40.3	43.0	51.9	58.8	65.4	59.5	57.6	40.5	60.6	57.1	
Level of Service (LOS)	D	D	D	D	F	F	E	E	D	E	E	
Approach Delay, s/veh / LOS	41.0		D	60.3		E	45.8		D	59.5		E
Intersection Delay, s/veh / LOS	53.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.3	A	2.1	B	1.1	A	0.8	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed_Uturns.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	89	1172			1445	112				99	0	124

Signal Information				Phase Diagram									
Cycle, s	140.0	Reference Phase	2	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Offset, s	0	Reference Point	End	Green	12.4	76.4	31.4	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	19.0	102.0		83.0				38.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.3
Queue Clearance Time (g <sub>s</sub> ), s	5.7							12.4
Green Extension Time (g <sub>e</sub> ), s	0.1	0.0		0.0				0.8
Phase Call Probability	1.00							1.00
Max Out Probability	0.08							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	101	1329			1026	1026				108	0	135
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1747				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	3.7	13.9			58.2	76.4				7.0	0.0	10.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	3.7	13.9			58.2	76.4				7.0	0.0	10.4
Green Ratio (g/C)	0.65	0.68			0.55	0.55				0.22	0.22	0.22
Capacity (c), veh/h	210	3327			978	953				398	426	347
Volume-to-Capacity Ratio (X)	0.480	0.400			1.049	1.076				0.270	0.000	0.388
Available Capacity (c <sub>a</sub> ), veh/h	210	3327			978	953				398	426	347
Back of Queue (Q), veh/ln (95th percentile)	3.7	6.9			31.8	34.6				5.7	0.0	7.3
Queue Storage Ratio (RQ) (95th percentile)	0.71	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	37.1	7.5			17.1	16.8				44.8	0.0	46.1
Incremental Delay (d <sub>2</sub> ), s/veh	1.0	0.2			25.2	36.6				0.4	0.0	0.7
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	38.0	7.7			42.4	53.4				45.2	0.0	46.8
Level of Service (LOS)	D	A			F	F				D		D
Approach Delay, s/veh / LOS	9.9	A		47.9	D		0.0			46.1		D
Intersection Delay, s/veh / LOS	33.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.9	A			0.9	A



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Proposed_Uturns.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	5.4	16.4	40.9	18.4	25.9	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
				Red	3.0	3.0	3.0	3.0	3.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	12.0	47.5	35.0	70.5		32.5		25.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		14.5			18.3		8.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.6		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		0.00			0.30		0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	175	877	877	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	31.3	40.9	12.5	63.9	63.9	16.3	12.8		6.8	0.8	3.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	31.3	40.9	12.5	63.9	63.9	16.3	12.8		6.8	0.8	3.8
Green Ratio (g/C)	0.33	0.29	0.48	0.20	0.46	0.46	0.18	0.18		0.13	0.13	0.17
Capacity (c), veh/h	121	1426	761	363	818	818	644	298		238	250	271
Volume-to-Capacity Ratio (X)	0.045	0.822	0.797	0.482	1.072	1.073	0.675	0.547		0.402	0.048	0.184
Available Capacity (c <sub>a</sub> ), veh/h	121	1426	761	363	818	818	644	298		238	250	271
Back of Queue (Q), veh/ln (95th percentile)	0.2	19.3	25.7	6.9	30.5	30.6	11.8	9.2		5.7	0.7	2.7
Queue Storage Ratio (RQ) (95th percentile)	0.03	0.00	1.16	0.48	0.00	0.00	0.00	0.00		0.00	0.00	0.58
Uniform Delay (d <sub>1</sub> ), s/veh	37.4	46.2	30.9	52.2	20.3	20.3	53.1	51.7		55.8	53.1	49.8
Incremental Delay (d <sub>2</sub> ), s/veh	0.2	5.5	8.5	0.1	35.2	35.4	2.8	2.1		1.1	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	37.6	51.6	39.4	52.3	55.5	55.7	55.9	53.8		56.9	53.2	50.1
Level of Service (LOS)	D	D	D	D	F	F	E	D		E	D	D
Approach Delay, s/veh / LOS	47.4		D	55.3		E	55.4		E	54.4		D
Intersection Delay, s/veh / LOS	52.1						D					

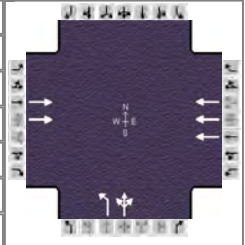
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A



## **HCS Analysis – PM Peak Traditional Widening**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1665			1260		327	0	170			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	96.2	30.6	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	0.0	0.0	0.0	0.0				
		Red	3.0	3.0	0.0	0.0	0.0	0.0				

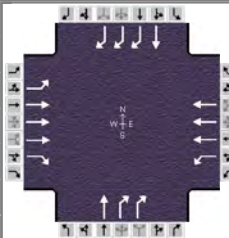
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		102.8		102.8		37.2		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						31.1		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.0		
Phase Call Probability						1.00		
Max Out Probability						1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2706			1370		355	355				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		96.2			17.1		29.1	29.1				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		96.2			17.1		29.1	29.1				
Green Ratio (g/C)		0.69			0.69		0.22	0.22				
Capacity (c), veh/h		2367			3355		370	370				
Volume-to-Capacity Ratio (X)		1.143			0.408		0.962	0.962				
Available Capacity (c <sub>a</sub> ), veh/h		2367			3355		370	370				
Back of Queue (Q), veh/ln (95th percentile)		50.0			9.8		22.6	22.6				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		10.7			9.5		54.1	54.1				
Incremental Delay (d <sub>2</sub> ), s/veh		66.4			0.4		36.7	36.7				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		77.1			9.9		90.8	90.8				
Level of Service (LOS)		F			A		F	F				
Approach Delay, s/veh / LOS	77.1		E	9.9		A	76.8		E	0.0		
Intersection Delay, s/veh / LOS	57.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.6	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.2	A	1.4	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1850	381	85	1188			0	701		0	1779

Signal Information				Signal Timing (s)										
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	8.4	41.1	6.2	57.9	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0				
				Red	3.0	3.0	3.0	3.0	0.0	0.0				

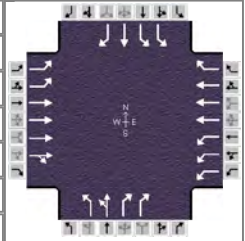
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	15.0	62.7	12.8	60.5		64.5		64.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		8.2			32.4		59.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		18.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.58		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2			4	14		8	18
Adjusted Flow Rate (v), veh/h	1	1944	400	115	1610			0	762		0	1934
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1643	1533	1707	1628			1900	1332		1900	1332
Queue Service Time (g <sub>s</sub> ), s	0.1	55.0	35.9	6.2	42.1			0.0	30.4		0.0	57.9
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	55.0	35.9	6.2	42.1			0.0	30.4		0.0	57.9
Green Ratio (g/C)	0.06	0.40	0.40	0.04	0.38			0.41	0.46		0.41	0.47
Capacity (c), veh/h	109	1975	614	76	1880			786	1220		786	1892
Volume-to-Capacity Ratio (X)	0.010	0.984	0.651	1.524	0.856			0.000	0.625		0.000	1.022
Available Capacity (c <sub>a</sub> ), veh/h	109	1975	614	76	1880			786	1220		786	1892
Back of Queue (Q), veh/ln (95th percentile)	0.1	32.4	24.4	14.4	23.4			0.0	11.9		0.0	34.3
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.70		0.00	1.13
Uniform Delay (d <sub>1</sub> ), s/veh	64.0	55.1	57.1	65.9	38.4			0.0	28.8		0.0	36.9
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	12.1	3.1	283.9	4.5			0.0	1.0		0.0	26.4
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Control Delay (d), s/veh	64.0	67.3	60.2	349.8	42.9			0.0	29.8		0.0	63.3
Level of Service (LOS)	E	E	E	F	D			C				F
Approach Delay, s/veh / LOS	66.1		E	63.4		E	29.8		C	63.3		E
Intersection Delay, s/veh / LOS	60.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.8	A	1.2	A	1.7	A	3.7	D

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	191	1412	77	867	1779	321	170	102	597	222	140	242

Signal Information				Signal Timing (s)								Signal Phases			
Cycle, s	140.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	33.9	17.9	9.9	27.4	17.9	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	3.0	0.0					

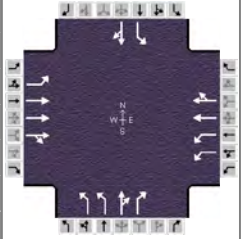
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	16.5	41.0	40.5	65.0		24.5		34.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	9.7		28.7			19.9		22.3
Green Extension Time (g <sub>e</sub> ), s	0.1	0.0	2.3	0.0		0.0		1.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		0.80			1.00		0.75

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	197	1161	373	1023	2100	379	185	111	649	241	152	263
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1810	1743	1723	1643	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	7.7	22.9	22.7	26.7	58.4	11.7	14.4	7.6	17.9	8.5	9.9	20.3
Cycle Queue Clearance Time (g <sub>c</sub> ), s	7.7	22.9	22.7	26.7	58.4	11.7	14.4	7.6	17.9	8.5	9.9	20.3
Green Ratio (g/C)	0.07	0.25	0.25	0.24	0.42	0.61	0.13	0.13	0.37	0.20	0.20	0.27
Capacity (c), veh/h	246	1334	428	1251	2056	967	225	241	1044	674	368	425
Volume-to-Capacity Ratio (X)	0.800	0.870	0.872	0.818	1.021	0.392	0.823	0.461	0.622	0.358	0.413	0.619
Available Capacity (c <sub>a</sub> ), veh/h	246	1334	428	1251	2056	967	225	241	1044	674	368	425
Back of Queue (Q), veh/ln (95th percentile)	6.0	7.8	8.6	14.6	29.6	2.5	12.2	6.7	14.1	6.6	8.3	7.1
Queue Storage Ratio (RQ) (95th percentile)	1.01	0.00	0.00	0.65	0.00	0.26	1.04	0.00	0.00	1.53	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	61.3	19.1	18.2	54.6	38.1	6.5	59.5	56.6	36.1	48.7	49.3	45.1
Incremental Delay (d <sub>2</sub> ), s/veh	10.4	4.9	13.4	1.0	15.2	0.3	21.2	1.4	1.1	0.3	0.7	2.7
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	71.7	24.0	31.7	55.6	53.3	6.7	80.7	58.0	37.2	49.0	50.0	47.8
Level of Service (LOS)	E	C	C	E	F	A	F	E	D	D	D	D
Approach Delay, s/veh / LOS	31.1		C	48.9		D	48.2		D	48.8		D
Intersection Delay, s/veh / LOS	44.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.0	C	3.9	D	3.5	D
Bicycle LOS Score / LOS	1.2	A	2.3	B	2.0	B	1.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 PM Peak_Traditional Widening.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	36	1227	52	328	1414	58	95	7	257	102	18	31

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	10.9	25.9	44.3	5.1	9.1	5.1			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	3.6			
				Red	3.0	3.0	3.0	3.0	3.0	3.0			

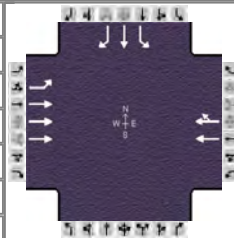
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	17.5	50.9	50.0	83.4	11.7	11.7	27.4	27.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	4.0		19.7		6.1	7.1	9.9	5.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.9	0.0	0.0	0.0	0.2	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.03		0.00		1.00	1.00	0.00	0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	39	939	459	456	1024	1024	103	8	279	111	53	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1753	1740	1792	1767	1740	1881	1594	1792	1689	
Queue Service Time (g <sub>s</sub> ), s	2.0	34.4	34.4	17.7	76.8	76.8	4.1	0.5	5.1	7.9	3.9	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.0	34.4	34.4	17.7	76.8	76.8	4.1	0.5	5.1	7.9	3.9	
Green Ratio (g/C)	0.39	0.32	0.32	0.31	0.55	0.55	0.04	0.04	0.35	0.15	0.15	
Capacity (c), veh/h	190	1134	555	1079	983	970	127	69	552	266	251	
Volume-to-Capacity Ratio (X)	0.208	0.827	0.827	0.423	1.041	1.056	0.815	0.111	0.506	0.417	0.212	
Available Capacity (c <sub>a</sub> ), veh/h	190	1134	555	1079	983	970	127	69	552	266	251	
Back of Queue (Q), veh/ln (95th percentile)	2.6	23.0	23.6	10.4	41.8	43.4	4.3	0.5	12.2	6.5	3.0	
Queue Storage Ratio (RQ) (95th percentile)	0.33	0.00	0.00	0.45	0.00	0.00	0.59	0.00	1.66	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	36.1	47.4	47.3	53.7	27.2	27.0	67.0	65.3	36.3	54.1	52.4	
Incremental Delay (d <sub>2</sub> ), s/veh	0.5	6.5	12.4	0.0	24.6	30.2	32.0	0.7	0.7	1.0	0.4	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	36.6	53.9	59.7	53.7	51.8	57.3	99.0	66.0	37.0	55.1	52.8	
Level of Service (LOS)	D	D	E	D	F	F	F	E	D	E	D	
Approach Delay, s/veh / LOS	55.3		E	54.4		D	54.0		D	54.4		D
Intersection Delay, s/veh / LOS	54.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.3	A	2.1	B	1.1	A	0.8	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	89	1172			1445	112				99	0	124

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Offset, s	0	Reference Point	End	Green	13.4	75.4	31.4	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	20.0	102.0		82.0				38.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.3
Queue Clearance Time (g <sub>s</sub> ), s	5.6							12.4
Green Extension Time (g <sub>e</sub> ), s	0.1	0.0		0.0				0.8
Phase Call Probability	1.00							1.00
Max Out Probability	0.03							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	101	1329			1007	1007				108	0	135
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1747				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	3.6	18.3			59.1	75.4				7.0	0.0	10.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	3.6	18.3			59.1	75.4				7.0	0.0	10.4
Green Ratio (g/C)	0.65	0.68			0.54	0.54				0.22	0.22	0.22
Capacity (c), veh/h	223	3327			965	941				398	426	347
Volume-to-Capacity Ratio (X)	0.453	0.400			1.043	1.070				0.270	0.000	0.388
Available Capacity (c <sub>a</sub> ), veh/h	223	3327			965	941				398	426	347
Back of Queue (Q), veh/ln (95th percentile)	3.5	9.3			31.2	34.0				5.7	0.0	7.3
Queue Storage Ratio (RQ) (95th percentile)	0.68	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	36.2	11.2			17.9	17.5				44.8	0.0	46.1
Incremental Delay (d <sub>2</sub> ), s/veh	0.6	0.2			22.7	33.9				0.4	0.0	0.7
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.8	11.3			40.6	51.4				45.2	0.0	46.8
Level of Service (LOS)	D	B			F	F				D		D
Approach Delay, s/veh / LOS	13.1	B		46.0	D		0.0			46.1		D
Intersection Delay, s/veh / LOS	33.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.9	A			0.9	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1> 7:00
File Name	2014 PM Peak_Traditional Widening.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information				Phase Diagrams									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	8.4	19.4	37.1	16.5	25.6	0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	3.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	15.0	43.7	41.0	69.7		32.2		23.1
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		13.9			18.3		8.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.6		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		0.00			0.34		0.07

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	173	866	866	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	32.5	37.1	11.9	63.1	63.1	16.3	12.9		6.9	0.8	3.7
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	32.5	37.1	11.9	63.1	63.1	16.3	12.9		6.9	0.8	3.7
Green Ratio (g/C)	0.32	0.26	0.45	0.25	0.45	0.45	0.18	0.18		0.12	0.12	0.18
Capacity (c), veh/h	160	1294	714	440	808	807	636	295		213	224	284
Volume-to-Capacity Ratio (X)	0.034	0.906	0.849	0.393	1.072	1.073	0.683	0.553		0.449	0.053	0.176
Available Capacity (c <sub>a</sub> ), veh/h	160	1294	714	440	808	807	636	295		213	224	284
Back of Queue (Q), veh/ln (95th percentile)	0.3	20.6	27.8	6.6	30.3	30.3	11.8	9.2		5.8	0.7	2.7
Queue Storage Ratio (RQ) (95th percentile)	0.05	0.00	1.25	0.46	0.00	0.00	0.00	0.00		0.00	0.00	0.57
Uniform Delay (d <sub>1</sub> ), s/veh	36.9	49.8	34.4	47.9	20.6	20.6	53.4	52.0		57.5	54.8	48.8
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	10.7	12.1	0.1	35.4	35.6	3.0	2.2		1.5	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	37.0	60.5	46.5	47.9	56.0	56.2	56.4	54.2		59.0	54.9	49.1
Level of Service (LOS)	D	E	D	D	F	F	E	D		E	D	D
Approach Delay, s/veh / LOS	55.7		E	55.3		E	55.8		E	55.6		E
Intersection Delay, s/veh / LOS	55.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A

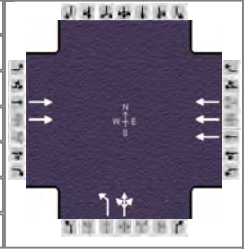


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**HCS Analysis – PM Peak Traditional Widening –  
Two Left Turn lanes at Howe Road**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening_2WBL.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1665			1260		327	0	170			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	96.2	30.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

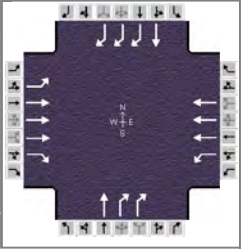
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		102.8		102.8		37.2		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						31.1		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.0		
Phase Call Probability						1.00		
Max Out Probability						1.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2706			1370		355	355				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		96.2			17.1		29.1	29.1				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		96.2			17.1		29.1	29.1				
Green Ratio (g/C)		0.69			0.69		0.22	0.22				
Capacity (c), veh/h		2367			3355		370	370				
Volume-to-Capacity Ratio (X)		1.143			0.408		0.962	0.962				
Available Capacity (c <sub>a</sub> ), veh/h		2367			3355		370	370				
Back of Queue (Q), veh/ln (95th percentile)		45.8			9.8		22.6	22.6				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		9.7			9.5		54.1	54.1				
Incremental Delay (d <sub>2</sub> ), s/veh		66.5			0.4		36.7	36.7				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		76.2			9.9		90.8	90.8				
Level of Service (LOS)		F			A		F	F				
Approach Delay, s/veh / LOS	76.2	E		9.9	A		76.8	E		0.0		
Intersection Delay, s/veh / LOS	56.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.6	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.2	A	1.4	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening_2WBL.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1850	381	85	1188			0	701		0	1779

Signal Information				Signal Timing (s)									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	8.4	42.0	6.2	57.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

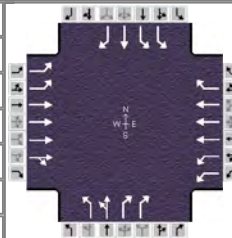
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	15.0	63.6	12.8	61.4		63.6		63.6
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		8.2			32.8		59.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		17.3		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.60		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2		4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1944	400	115	1610		0	762		0	1934	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1643	1533	1707	1628		1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	54.9	35.7	6.2	41.6		0.0	30.8		0.0	57.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	54.9	35.7	6.2	41.6		0.0	30.8		0.0	57.0	
Green Ratio (g/C)	0.06	0.41	0.41	0.04	0.39		0.41	0.45		0.41	0.47	
Capacity (c), veh/h	109	2007	624	76	1911		774	1202		774	1866	
Volume-to-Capacity Ratio (X)	0.010	0.969	0.641	1.524	0.842		0.000	0.634		0.000	1.036	
Available Capacity (c <sub>a</sub> ), veh/h	109	2007	624	76	1911		774	1202		774	1866	
Back of Queue (Q), veh/ln (95th percentile)	0.1	33.5	24.7	14.4	23.1		0.0	12.1		0.0	35.1	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.71		0.00	1.16	
Uniform Delay (d <sub>1</sub> ), s/veh	62.5	59.0	55.6	65.9	37.5		0.0	29.5		0.0	37.3	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	11.3	3.7	283.9	4.0		0.0	1.1		0.0	30.8	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	62.5	70.3	59.3	349.8	41.5		0.0	30.6		0.0	68.1	
Level of Service (LOS)	E	E	E	F	D			C			F	
Approach Delay, s/veh / LOS	68.4		E	62.1		E	30.6		C	68.1		E
Intersection Delay, s/veh / LOS	62.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.6	B	3.3	C	3.4	C
Bicycle LOS Score / LOS	1.8	A	1.2	A	1.7	A	3.7	D

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening_2WBL.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	191	1412	77	867	1779	321	170	102	597	222	140	242

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	33.8	32.1	8.4	18.8	13.9	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
				Red	3.0	3.0	3.0	3.0	3.0	0.0			

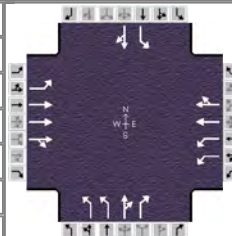
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	15.0	53.7	40.4	79.1		20.5		25.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	9.9		35.8			15.9		20.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	197	1161	373	1016	2084	376	185	111	649	241	152	263
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1810	1743	1723	1643	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	7.9	9.8	9.0	33.8	47.8	10.0	13.9	7.9	13.9	9.1	10.7	18.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	7.9	9.8	9.0	33.8	47.8	10.0	13.9	7.9	13.9	9.1	10.7	18.8
Green Ratio (g/C)	0.06	0.34	0.34	0.24	0.52	0.65	0.10	0.10	0.34	0.13	0.13	0.19
Capacity (c), veh/h	209	1826	586	832	2553	1029	174	187	961	463	253	310
Volume-to-Capacity Ratio (X)	0.943	0.636	0.637	1.221	0.817	0.365	1.059	0.594	0.675	0.522	0.602	0.849
Available Capacity (c <sub>a</sub> ), veh/h	209	1826	586	832	2553	1029	174	187	961	463	253	310
Back of Queue (Q), veh/ln (95th percentile)	6.9	4.1	4.1	35.8	20.8	1.8	15.9	7.2	14.9	7.3	9.1	11.1
Queue Storage Ratio (RQ) (95th percentile)	1.16	0.00	0.00	1.59	0.00	0.18	1.36	0.00	0.00	1.68	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	62.7	7.7	6.9	65.8	25.1	5.6	63.1	60.3	39.5	56.4	57.1	54.4
Incremental Delay (d <sub>2</sub> ), s/veh	33.2	1.0	3.1	102.0	0.7	0.2	84.8	5.0	1.9	1.1	4.0	19.4
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	95.9	8.7	10.0	167.8	25.7	5.8	147.8	65.3	41.4	57.5	61.1	73.9
Level of Service (LOS)	F	A	A	F	C	A	F	E	D	E	E	E
Approach Delay, s/veh / LOS	18.9	B		65.1	E		65.0	E		64.9	E	
Intersection Delay, s/veh / LOS	53.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.8	D	3.5	D
Bicycle LOS Score / LOS	1.2	A	2.3	B	2.0	B	1.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 PM Peak_Traditional Widening_2WBL.xus						
Project Description	PM Peak Original						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	36	1227	52	328	1414	58	95	7	257	102	18	31

Signal Information				Signal Timing Diagram							
Cycle, s	140.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On								
Force Mode	Fixed	Simult. Gap N/S	On								
Green	11.3	25.0	44.7	5.1	9.2	5.1					
Yellow	3.6	3.6	3.6	3.6	3.6	3.6					
Red	3.0	3.0	3.0	3.0	3.0	3.0					

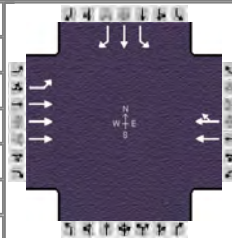
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	17.9	51.3	49.5	82.9	11.7	11.7	27.5	27.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	4.0		19.7		6.1	7.1	9.9	5.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.9	0.0	0.0	0.0	0.2	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.02		0.00		1.00	1.00	0.00	0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	39	939	459	460	1031	1031	103	8	279	111	53	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1753	1740	1792	1767	1740	1881	1594	1792	1689	
Queue Service Time (g <sub>s</sub> ), s	2.0	34.3	34.3	17.7	76.3	76.3	4.1	0.5	5.1	7.9	3.9	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.0	34.3	34.3	17.7	76.3	76.3	4.1	0.5	5.1	7.9	3.9	
Green Ratio (g/C)	0.40	0.32	0.32	0.31	0.55	0.55	0.04	0.04	0.34	0.15	0.15	
Capacity (c), veh/h	195	1145	560	1066	977	963	127	69	547	267	252	
Volume-to-Capacity Ratio (X)	0.202	0.820	0.820	0.431	1.056	1.070	0.815	0.111	0.511	0.415	0.211	
Available Capacity (c <sub>a</sub> ), veh/h	195	1145	560	1066	977	963	127	69	547	267	252	
Back of Queue (Q), veh/ln (95th percentile)	1.6	22.8	23.4	11.5	36.7	37.9	4.3	0.5	12.3	6.5	3.0	
Queue Storage Ratio (RQ) (95th percentile)	0.21	0.00	0.00	0.50	0.00	0.00	0.59	0.00	1.67	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	35.8	46.7	46.6	53.2	16.3	16.0	67.0	65.3	36.7	54.0	52.3	
Incremental Delay (d <sub>2</sub> ), s/veh	0.5	6.2	11.8	0.1	35.6	41.2	32.0	0.7	0.8	1.0	0.4	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	36.3	52.9	58.5	53.3	51.9	57.2	99.0	66.0	37.5	55.0	52.7	
Level of Service (LOS)	D	D	E	D	F	F	F	E	D	E	D	
Approach Delay, s/veh / LOS	54.2		D	54.3		D	54.3		D	54.3		D
Intersection Delay, s/veh / LOS	54.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.3	A	2.1	B	1.1	A	0.8	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak_Traditional Widening_2WBL.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	89	1172			1445	112				99	0	124

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Offset, s	0	Reference Point	End	Green	13.4	75.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	20.0	101.6		81.6				38.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.3
Queue Clearance Time (g <sub>s</sub> ), s	5.6							12.3
Green Extension Time (g <sub>e</sub> ), s	0.1	0.0		0.0				0.8
Phase Call Probability	1.00							1.00
Max Out Probability	0.03							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	101	1329			1001	1001				108	0	135
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1747				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	3.6	18.3			59.4	75.0				7.0	0.0	10.3
Cycle Queue Clearance Time (g <sub>c</sub> ), s	3.6	18.3			59.4	75.0				7.0	0.0	10.3
Green Ratio (g/C)	0.65	0.68			0.54	0.54				0.23	0.23	0.23
Capacity (c), veh/h	223	3313			960	936				403	432	352
Volume-to-Capacity Ratio (X)	0.453	0.401			1.042	1.069				0.267	0.000	0.383
Available Capacity (c <sub>a</sub> ), veh/h	223	3313			960	936				403	432	352
Back of Queue (Q), veh/ln (95th percentile)	3.5	9.3			31.1	33.8				5.6	0.0	7.3
Queue Storage Ratio (RQ) (95th percentile)	0.68	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	36.0	11.3			18.1	17.7				44.5	0.0	45.8
Incremental Delay (d <sub>2</sub> ), s/veh	0.6	0.2			22.4	33.5				0.4	0.0	0.7
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.6	11.4			40.5	51.3				44.9	0.0	46.5
Level of Service (LOS)	D	B			F	F				D		D
Approach Delay, s/veh / LOS	13.2	B		45.9	D		0.0			45.8		D
Intersection Delay, s/veh / LOS	33.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.9	A			0.9	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1> 7:00		
File Name	2014 PM Peak_Traditional Widening_2WBL.xus						
Project Description	PM Peak Original						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
				Green	8.4	19.4	37.1	16.5	25.6	0.0			
				Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
				Red	3.0	3.0	3.0	3.0	3.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	15.0	43.7	41.0	69.7		32.2		23.1
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		13.8			18.3		8.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.6		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		0.00			0.34		0.07

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	172	862	862	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	32.5	37.1	11.8	63.1	63.1	16.3	12.9		6.9	0.8	3.7
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	32.5	37.1	11.8	63.1	63.1	16.3	12.9		6.9	0.8	3.7
Green Ratio (g/C)	0.32	0.26	0.45	0.25	0.45	0.45	0.18	0.18		0.12	0.12	0.18
Capacity (c), veh/h	160	1294	714	440	808	807	636	295		213	224	284
Volume-to-Capacity Ratio (X)	0.034	0.906	0.849	0.391	1.067	1.068	0.683	0.553		0.449	0.053	0.176
Available Capacity (c <sub>a</sub> ), veh/h	160	1294	714	440	808	807	636	295		213	224	284
Back of Queue (Q), veh/ln (95th percentile)	0.3	20.6	27.8	6.6	29.6	29.7	11.8	9.2		5.8	0.7	2.7
Queue Storage Ratio (RQ) (95th percentile)	0.05	0.00	1.25	0.46	0.00	0.00	0.00	0.00		0.00	0.00	0.57
Uniform Delay (d <sub>1</sub> ), s/veh	36.9	49.8	34.4	47.8	20.6	20.6	53.4	52.0		57.5	54.8	48.8
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	10.7	12.1	0.1	33.1	33.3	3.0	2.2		1.5	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	37.0	60.5	46.5	47.9	53.8	54.0	56.4	54.2		59.0	54.9	49.1
Level of Service (LOS)	D	E	D	D	F	F	E	D		E	D	D
Approach Delay, s/veh / LOS	55.7		E	53.3		D	55.8		E	55.6		E
Intersection Delay, s/veh / LOS	54.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A

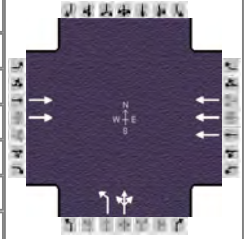


**HCS Analysis – AM Modified Widening at SR-82  
and Howe Road Intersection**



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		662			1362		266	0	116			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
		Green	77.1	49.7	0.0	0.0	0.0	0.0				
		Yellow	3.6	3.6	0.0	0.0	0.0	0.0				
		Red	3.0	3.0	0.0	0.0	0.0	0.0				

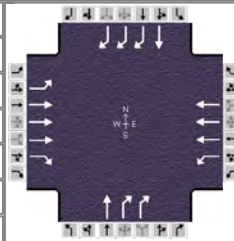
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		83.7		83.7		56.3		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						20.6		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.6		
Phase Call Probability						1.00		
Max Out Probability						0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2017			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		77.1			27.4		18.6	18.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		77.1			27.4		18.6	18.6				
Capacity (c), veh/h		1897			2689		600	600				
Volume-to-Capacity Ratio (X)		1.063			0.551		0.482	0.482				
Available Capacity (c <sub>a</sub> ), veh/h		1897			2689		600	600				
Back of Queue (Q), veh/ln (95th percentile)		14.7			15.6		12.3	12.3				
Overflow Queue (Q <sub>3</sub> ), veh/ln		0.0			0.0		0.0	0.0				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		8.6			20.3		35.1	35.1				
Incremental Delay (d <sub>2</sub> ), s/veh		29.7			0.8		0.6	0.6				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		38.3			21.1		35.7	35.7				
Level of Service (LOS)		F			C		D	D				
Approach Delay, s/veh / LOS	38.3		D	21.1		C	34.5		C	0.0		
Intersection Delay, s/veh / LOS	31.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1717	230	107	739			0	318		0	908

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.4	58.4	19.4	22.4	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0			
				Red	3.0	3.0	3.0	3.0	0.0	0.0			

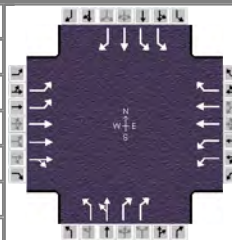
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	20.0	85.0	26.0	91.0		29.0		29.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		20.1			16.6		24.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		3.3		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		1.00			0.84		1.00

Movement Group Results	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Approach Movement													
Assigned Movement	1	6	16	5	2			4	14		8	18	
Adjusted Flow Rate (v), veh/h	1	1773	237	224	1546			0	346		0	987	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	995	1533	1707	1628			1900	1332		1900	1332	
Queue Service Time (g <sub>s</sub> ), s	0.1	78.4	19.8	18.1	27.1			0.0	14.6		0.0	22.4	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	78.4	19.8	18.1	27.1			0.0	14.6		0.0	22.4	
Capacity (c), veh/h	173	1671	859	237	2944			304	795		304	1022	
Volume-to-Capacity Ratio (X)	0.006	1.061	0.277	0.946	0.525			0.000	0.435		0.000	0.966	
Available Capacity (c <sub>a</sub> ), veh/h	173	1671	859	237	2944			304	795		304	1022	
Back of Queue (Q), veh/ln (95th percentile)	0.1	30.9	11.4	14.3	15.0			0.0	8.4		0.0	19.2	
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0	
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.50		0.00	0.63	
Uniform Delay (d <sub>1</sub> ), s/veh	60.8	46.7	35.9	53.3	17.6			0.0	39.6		0.0	51.5	
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	31.7	0.2	38.8	0.6			0.0	0.4		0.0	20.3	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	60.8	78.4	36.2	92.1	18.2			0.0	40.0		0.0	71.8	
Level of Service (LOS)	E	F	D	F	B				D			E	
Approach Delay, s/veh / LOS	73.4		E	27.5		C		40.0		D	71.8		E
Intersection Delay, s/veh / LOS	55.0						D						

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.5		B	2.5		B	3.3		C	3.4		C
Bicycle LOS Score / LOS	1.7		A	1.0		A	1.1		A	2.1		B

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	28	1062	59	400	1227	48	116	32	846	39	3	11

Signal Information														
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	26.4	31.8	14.4	16.4	18.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0				
				Red	3.0	3.0	3.0	3.0	3.0	0.0				

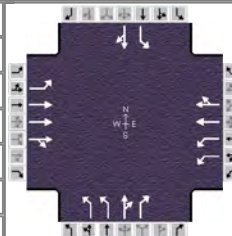
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	21.0	59.4	33.0	71.4		24.6		23.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	3.0		19.1			20.0		3.5
Green Extension Time (g <sub>e</sub> ), s	4.0	0.0	1.4	0.0		0.0		0.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.30		0.27			1.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	28	556	577	522	1601	63	126	35	920	42	3	12
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	856	1776	1723	1723	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	1.0	37.2	37.2	17.1	64.8	0.8	9.4	2.3	18.0	1.5	0.2	0.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.0	37.2	37.2	17.1	64.8	0.8	9.4	2.3	18.0	1.5	0.2	0.8
Capacity (c), veh/h	358	646	670	650	1595	916	226	242	895	404	220	351
Volume-to-Capacity Ratio (X)	0.079	0.861	0.862	0.803	1.004	0.068	0.558	0.144	1.028	0.105	0.015	0.034
Available Capacity (c <sub>a</sub> ), veh/h	358	646	670	650	1595	916	226	242	895	404	220	351
Back of Queue (Q), veh/ln (95th percentile)	0.8	11.1	20.3	6.5	17.8	0.3	7.8	2.0	27.7	1.2	0.2	0.6
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	0.13	0.00	0.00	0.29	0.00	0.03	0.67	0.00	0.00	0.28	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	53.9	24.0	23.8	29.3	15.2	1.8	57.3	54.2	47.8	55.2	54.7	42.9
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	12.8	12.4	2.0	12.5	0.0	3.0	0.3	37.3	0.1	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	54.0	36.7	36.2	31.3	27.8	1.9	60.3	54.4	85.1	55.4	54.7	42.9
Level of Service (LOS)	D	D	D	C	F	A	E	D	F	E	D	D
Approach Delay, s/veh / LOS	36.9		D	27.9		C	81.2		F	52.7		D
Intersection Delay, s/veh / LOS	43.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	2.0	A	2.3	B	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	21	1050	39	41	1166	60	4	1	11	59	3	10

Signal Information				Signal Timing (s)										
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	8.4	62.9	20.9	21.4	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0				
				Red	3.0	3.0	3.0	3.0	0.0	0.0				

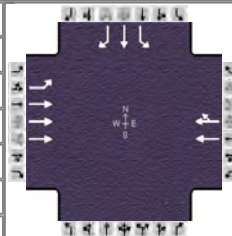
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	15.0	69.5	15.0	69.5	27.5	28.0	27.5	28.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	2.9		4.3		2.1	2.8	6.4	3.0
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.12		0.97		0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	22	755	371	56	842	835	4	1	12	64	14	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1758	1740	1792	1761	1740	1881	1594	1792	1652	
Queue Service Time (g <sub>s</sub> ), s	0.9	9.6	9.5	2.3	62.9	62.9	0.1	0.1	0.8	4.4	1.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.9	9.6	9.5	2.3	62.9	62.9	0.1	0.1	0.8	4.4	1.0	
Capacity (c), veh/h	162	1611	790	209	805	791	519	288	339	267	253	
Volume-to-Capacity Ratio (X)	0.134	0.469	0.469	0.269	1.045	1.055	0.008	0.004	0.035	0.240	0.056	
Available Capacity (c <sub>a</sub> ), veh/h	162	1611	790	209	805	791	519	288	339	267	253	
Back of Queue (Q), veh/ln (95th percentile)	0.7	5.4	5.6	1.7	31.0	31.5	0.1	0.1	0.6	3.7	0.8	
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio (RQ) (95th percentile)	0.09	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.08	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	33.0	8.9	8.8	66.8	23.4	23.3	50.7	50.3	43.7	52.5	50.7	
Incremental Delay (d <sub>2</sub> ), s/veh	0.3	0.9	1.8	0.1	27.1	30.8	0.0	0.0	0.0	0.5	0.1	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	33.3	9.8	10.6	66.9	50.5	54.1	50.7	50.3	43.7	53.0	50.8	
Level of Service (LOS)	C	A	B	E	F	F	D	D	D	D	D	
Approach Delay, s/veh / LOS	10.5		B	52.7		D	45.9		D	52.6		D
Intersection Delay, s/veh / LOS	36.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.5	A	0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	54	1028			1082	67				47	0	40

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	5.4	60.8	54.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0			
				Red	3.0	3.0	3.0	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.0	79.4		67.4				60.6
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.2
Queue Clearance Time (g <sub>s</sub> ), s	4.4							4.5
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	58	1097			772	762				51	0	43
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1755				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	2.4	6.0			43.0	60.6				2.5	0.0	2.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.4	6.0			43.0	60.6				2.5	0.0	2.5
Capacity (c), veh/h	121	2539			778	762				684	733	597
Volume-to-Capacity Ratio (X)	0.476	0.432			0.992	0.999				0.075	0.000	0.073
Available Capacity (c <sub>a</sub> ), veh/h	121	2539			778	762				684	733	597
Back of Queue (Q), veh/ln (95th percentile)	4.0	2.8			15.1	15.5				2.0	0.0	1.7
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	0.77	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	34.4	4.3			16.1	16.3				27.2	0.0	27.2
Incremental Delay (d <sub>2</sub> ), s/veh	2.3	0.4			8.1	9.6				0.0	0.0	0.1
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	36.7	4.7			24.2	25.8				27.2	0.0	27.2
Level of Service (LOS)	D	A			C	C				C		C
Approach Delay, s/veh / LOS	6.3	A		25.0	C		0.0			27.2	C	
Intersection Delay, s/veh / LOS	17.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.1	A	1.5	A			0.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 AM Peak.xus						
Project Description							



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	42	1040	106	51	1016	133	31	8	17	5	0	6

Signal Information				Signal Timing (s)								Signal Phases			
Cycle, s	140.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	10.4	54.6	21.4	27.2	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	17.0	61.2	17.0	61.2		33.8		28.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.9		6.9			3.8		2.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		0.2		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.05		1.00			0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	46	1130	115	63	724	701	34	27		5	0	7
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1720	1740	1693		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	1.9	25.7	4.5	4.9	54.6	54.6	1.1	1.8		0.4	0.0	0.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.9	25.7	4.5	4.9	54.6	54.6	1.1	1.8		0.4	0.0	0.4
Capacity (c), veh/h	191	1904	931	133	699	671	676	329		277	290	362
Volume-to-Capacity Ratio (X)	0.239	0.594	0.124	0.475	1.036	1.045	0.050	0.083		0.020	0.000	0.018
Available Capacity (c <sub>a</sub> ), veh/h	191	1904	931	133	699	671	676	329		277	290	362
Back of Queue (Q), veh/ln (95th percentile)	2.8	15.6	3.0	3.4	21.1	20.7	0.9	1.4		0.3	0.0	0.3
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	0.40	0.00	0.14	0.23	0.00	0.00	0.00	0.00		0.00	0.00	0.07
Uniform Delay (d <sub>1</sub> ), s/veh	31.1	33.9	13.0	67.2	19.7	19.3	45.9	46.2		50.4	0.0	42.0
Incremental Delay (d <sub>2</sub> ), s/veh	0.6	1.4	0.3	0.4	24.3	27.7	0.0	0.1		0.0	0.0	0.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	31.8	35.3	13.3	67.6	44.0	47.0	45.9	46.3		50.4	0.0	42.0
Level of Service (LOS)	C	D	B	E	F	F	D	D		D		D
Approach Delay, s/veh / LOS	33.2		C	46.4		D	46.1		D	45.8		D
Intersection Delay, s/veh / LOS	40.4						D					

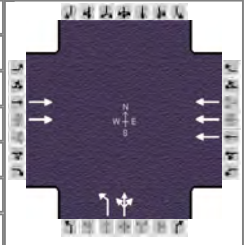
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.2	A	1.6	A	0.6	A	0.5	A



**HCS Analysis – PM Modified Widening at SR-82  
and Howe Road Intersection**

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		1665			1260		327	0	170			

Signal Information												
Cycle, s	140.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
Green	94.7	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		101.3		101.3		38.7		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						30.7		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		0.4		
Phase Call Probability						1.00		
Max Out Probability						1.00		

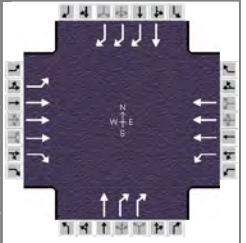
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2628			1370		355	355				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		94.7			17.7		28.7	28.7				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		94.7			17.7		28.7	28.7				
Capacity (c), veh/h		2331			3303		388	388				
Volume-to-Capacity Ratio (X)		1.128			0.415		0.917	0.917				
Available Capacity (c <sub>a</sub> ), veh/h		2331			3303		388	388				
Back of Queue (Q), veh/ln (95th percentile)		35.2			10.2		21.2	21.2				
Overflow Queue (Q <sub>3</sub> ), veh/ln		0.0			0.0		0.0	0.0				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		8.8			10.2		52.6	52.6				
Incremental Delay (d <sub>2</sub> ), s/veh		59.1			0.4		26.1	26.1				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		67.9			10.6		78.8	78.8				
Level of Service (LOS)		F			B		E	E				
Approach Delay, s/veh / LOS	67.9	E		10.6	B		68.3	E		0.0		
Intersection Delay, s/veh / LOS	50.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.2	A	1.4	A		



# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 SB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	1	1850	381	85	1188			0	701		0	1779

Signal Information				Signal Timing (s)										
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End	Green	5.4	41.0	9.4	57.8	0.0	0.0				
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	0.0	0.0				

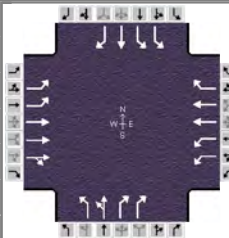
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	3.0	2.0	4.0		7.0		7.0
Phase Duration, s	12.0	59.6	16.0	63.6		64.4		64.4
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.4		4.4
Queue Clearance Time (g <sub>s</sub> ), s	2.1		11.4			31.2		59.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.0	0.0		18.6		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			0.57		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2			4	14		8	18
Adjusted Flow Rate (v), veh/h	1	1912	394	115	1610			0	762		0	1934
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1643	1533	1707	1628			1900	1332		1900	1332
Queue Service Time (g <sub>s</sub> ), s	0.1	53.0	35.7	9.4	40.4			0.0	29.2		0.0	57.8
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.1	53.0	35.7	9.4	40.4			0.0	29.2		0.0	57.8
Capacity (c), veh/h	70	1866	581	115	1988			784	1279		784	1804
Volume-to-Capacity Ratio (X)	0.015	1.025	0.678	1.005	0.810			0.000	0.596		0.000	1.072
Available Capacity (c <sub>a</sub> ), veh/h	70	1866	581	115	1988			784	1279		784	1804
Back of Queue (Q), veh/ln (95th percentile)	0.1	33.3	23.6	10.3	22.2			0.0	9.7		0.0	37.6
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	0.00	0.00	0.00	0.00	0.00			0.00	0.57		0.00	1.24
Uniform Delay (d <sub>1</sub> ), s/veh	65.3	64.3	60.3	63.8	35.3			0.0	26.5		0.0	38.4
Incremental Delay (d <sub>2</sub> ), s/veh	0.0	20.2	2.6	78.5	3.1			0.0	0.8		0.0	43.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Control Delay (d), s/veh	65.3	84.4	62.9	142.3	38.4			0.0	27.3		0.0	81.9
Level of Service (LOS)	E	F	E	F	D			C			F	
Approach Delay, s/veh / LOS	80.8		F	45.4		D	27.3		C	81.9		F
Intersection Delay, s/veh / LOS	66.0						E					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.5		B	2.6		B	3.3		C	3.4		C
Bicycle LOS Score / LOS	1.8		A	1.2		A	1.7		A	3.7		D

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Howe Road	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	191	1412	77	867	1779	321	170	102	597	222	140	242

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	43.9	23.9	8.4	15.4	15.4	0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	3.0	0.0			

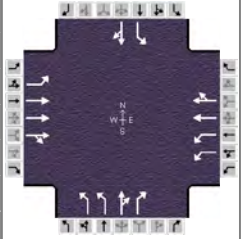
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	2.0	4.0	2.0	3.0		9.0		9.0
Phase Duration, s	15.0	45.5	50.5	81.0		22.0		22.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.2
Queue Clearance Time (g <sub>s</sub> ), s	9.9		39.7			17.4		17.4
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.8	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		0.99			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	197	1032	502	952	1954	353	185	111	649	241	152	263
Adjusted Saturation Flow Rate (s), veh/h/ln	1740	1810	1759	1723	1723	1579	1757	1881	1411	1723	1881	1594
Queue Service Time (g <sub>s</sub> ), s	7.9	38.9	38.9	37.7	74.4	9.0	14.6	7.8	15.4	9.4	11.0	15.4
Cycle Queue Clearance Time (g <sub>c</sub> ), s	7.9	38.9	38.9	37.7	74.4	9.0	14.6	7.8	15.4	9.4	11.0	15.4
Capacity (c), veh/h	209	1006	489	1080	1831	1013	193	207	1195	379	207	271
Volume-to-Capacity Ratio (X)	0.943	1.027	1.027	0.882	1.067	0.348	0.956	0.536	0.543	0.637	0.735	0.971
Available Capacity (c <sub>a</sub> ), veh/h	209	1006	489	1080	1831	1013	193	207	1195	379	207	271
Back of Queue (Q), veh/ln (95th percentile)	7.6	21.9	22.6	19.3	40.6	1.4	14.3	7.0	12.9	7.7	10.0	13.9
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	1.27	0.00	0.00	0.86	0.00	0.14	1.22	0.00	0.00	1.77	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	66.3	29.2	28.4	55.1	27.2	7.0	62.0	58.9	30.2	59.6	60.3	57.8
Incremental Delay (d <sub>2</sub> ), s/veh	37.4	31.0	41.3	0.9	31.7	0.1	52.0	2.7	0.5	3.5	12.8	46.4
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	103.7	60.2	69.7	56.0	58.8	7.1	114.0	61.6	30.7	63.1	73.1	104.1
Level of Service (LOS)	F	F	F	E	F	A	F	E	C	E	E	F
Approach Delay, s/veh / LOS	67.9		E	52.4		D	50.6		D	81.9		F
Intersection Delay, s/veh / LOS	59.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	3.1	C	2.0	B	1.6	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Southpark Mall East Drive	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	36	1227	52	328	1414	58	95	7	257	102	18	31

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	13.4	8.4	54.2	10.6	3.2	10.6			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	3.6			
				Red	3.0	3.0	3.0	3.0	3.0	3.0			

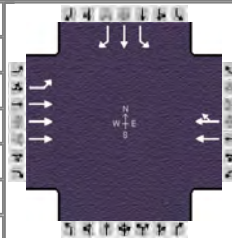
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	2.0	4.0	2.0	3.0	2.0	4.0
Phase Duration, s	20.0	60.8	35.0	75.8	17.2	17.2	27.0	27.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.1	4.3	4.1	4.3
Queue Clearance Time (g <sub>s</sub> ), s	3.7		17.8		6.0	12.6	9.9	5.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	1.3	0.0	0.1	0.0	0.2	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	0.00		0.04		0.58	1.00	0.00	0.01

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	39	939	459	399	898	894	103	8	279	111	53	
Adjusted Saturation Flow Rate (s), veh/h/ln	1774	1792	1753	1740	1792	1767	1740	1881	1594	1792	1689	
Queue Service Time (g <sub>s</sub> ), s	1.7	31.4	31.3	15.8	69.2	69.2	4.0	0.5	10.6	7.9	3.9	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	1.7	31.4	31.3	15.8	69.2	69.2	4.0	0.5	10.6	7.9	3.9	
Capacity (c), veh/h	225	1388	679	706	886	874	263	142	444	261	246	
Volume-to-Capacity Ratio (X)	0.175	0.676	0.676	0.566	1.013	1.023	0.392	0.053	0.629	0.425	0.216	
Available Capacity (c <sub>a</sub> ), veh/h	225	1388	679	706	886	874	263	142	444	261	246	
Back of Queue (Q), veh/ln (95th percentile)	1.3	20.4	20.5	8.9	30.6	31.1	3.2	0.5	13.7	6.6	3.0	
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio (RQ) (95th percentile)	0.17	0.00	0.00	0.39	0.00	0.00	0.44	0.00	1.86	0.00	0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	30.7	38.6	38.4	61.5	25.1	24.8	61.6	60.0	44.2	54.5	52.8	
Incremental Delay (d <sub>2</sub> ), s/veh	0.3	2.5	4.9	0.1	12.6	15.9	0.9	0.2	2.8	1.1	0.4	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	31.1	41.0	43.4	61.6	37.7	40.7	62.6	60.2	47.0	55.6	53.2	
Level of Service (LOS)	C	D	D	E	F	F	E	E	D	E	D	
Approach Delay, s/veh / LOS	41.5		D	43.3		D	51.4		D	54.8		D
Intersection Delay, s/veh / LOS	43.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.3	B	3.3	C	3.0	C
Bicycle LOS Score / LOS	1.3	A	2.1	B	1.1	A	0.8	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	Falling Water Rd	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 PM Peak.xus				
Project Description	PM Peak Original				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	89	1172			1445	112				99	0	124

Signal Information														
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	16.9	68.4	34.9	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	0.0	0.0	0.0				
				Red	3.0	3.0	3.0	0.0	0.0	0.0				

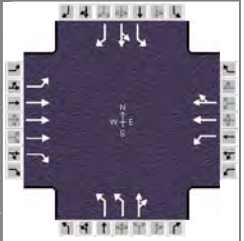
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				8
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	23.5	98.5		75.0				41.5
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6		6.6				6.6
Max Allow Headway (MAH), s	4.1	0.0		0.0				4.3
Queue Clearance Time (g <sub>s</sub> ), s	5.6							12.0
Green Extension Time (g <sub>e</sub> ), s	0.2	0.0		0.0				0.8
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				3	8	18
Adjusted Flow Rate (v), veh/h	101	1329			916	911				108	0	135
Adjusted Saturation Flow Rate (s), veh/h/ln	1792	1628			1792	1747				1774	1900	1548
Queue Service Time (g <sub>s</sub> ), s	3.6	19.1			65.5	68.4				6.8	0.0	10.0
Cycle Queue Clearance Time (g <sub>c</sub> ), s	3.6	19.1			65.5	68.4				6.8	0.0	10.0
Capacity (c), veh/h	268	3205			876	854				442	474	386
Volume-to-Capacity Ratio (X)	0.377	0.415			1.047	1.067				0.243	0.000	0.349
Available Capacity (c <sub>a</sub> ), veh/h	268	3205			876	854				442	474	386
Back of Queue (Q), veh/ln (95th percentile)	3.3	9.8			31.2	32.8				5.4	0.0	7.0
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	0.64	0.00			0.00	0.00				0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	32.9	12.5			19.9	19.5				42.0	0.0	43.2
Incremental Delay (d <sub>2</sub> ), s/veh	0.4	0.2			26.8	35.0				0.3	0.0	0.5
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Control Delay (d), s/veh	33.3	12.6			46.7	54.5				42.3	0.0	43.8
Level of Service (LOS)	C	B			F	F				D		D
Approach Delay, s/veh / LOS	14.1	B		50.6	D		0.0			43.1		D
Intersection Delay, s/veh / LOS	35.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.4	B	3.1	C	3.0	C
Bicycle LOS Score / LOS	1.2	A	1.9	A			0.9	A

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 PM Peak.xus						
Project Description	PM Peak Original						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	8.4	18.4	37.4	17.4	25.4	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0			
				Red	3.0	3.0	3.0	3.0	3.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	15.0	44.0	40.0	69.0		32.0		24.0
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		13.4			18.4		8.8
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.5		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		0.00			0.37		0.03

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	158	792	791	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	32.4	37.4	11.4	60.6	60.7	16.4	12.9		6.8	0.8	3.7
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	32.4	37.4	11.4	60.6	60.7	16.4	12.9		6.8	0.8	3.7
Capacity (c), veh/h	165	1304	715	427	799	798	631	292		225	236	294
Volume-to-Capacity Ratio (X)	0.033	0.899	0.848	0.370	0.991	0.991	0.689	0.558		0.425	0.051	0.170
Available Capacity (c <sub>a</sub> ), veh/h	165	1304	715	427	799	798	631	292		225	236	294
Back of Queue (Q), veh/ln (95th percentile)	0.2	20.5	27.7	6.5	22.2	22.2	11.9	9.2		5.8	0.7	2.7
Overflow Queue (Q <sub>3</sub> ), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	0.03	0.00	1.25	0.45	0.00	0.00	0.00	0.00		0.00	0.00	0.57
Uniform Delay (d <sub>1</sub> ), s/veh	36.3	49.5	34.4	51.9	21.6	21.6	53.6	52.2		56.7	54.0	48.1
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	10.1	12.0	0.0	7.7	7.7	3.2	2.3		1.3	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	36.4	59.6	46.3	52.0	29.3	29.3	56.8	54.5		58.0	54.1	48.4
Level of Service (LOS)	D	E	D	D	C	C	E	D		E	D	D
Approach Delay, s/veh / LOS	55.0		D	31.4		C	56.2		E	54.6		D
Intersection Delay, s/veh / LOS	45.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A

## **Appendix E**

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**IMS Review Email by the Office of Roadway  
Engineering, August 23, 2013**

## Blayney, Brian

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**From:** Harrington, Gary  
**Sent:** Friday, August 23, 2013 10:00 AM  
**To:** Blayney, Brian; Bline, Michael  
**Subject:** CUY-71-2.57 at SR 82, PID UNPRG, Roadway Review, Alternative Evaluation  
**Attachments:** UNPRG CUY-71 at SR 82 2013-07-31 IMS Review Transmittal ORE.doc

Brian & Mike – Some of this information may be redundant for you. I'm trying to paint a good picture to whoever else may see this.

I evaluated potential alternatives to the consultant's proposed design to introduce an additional exit ramp from I-71 SB. The alternatives were evaluated in Synchro and should be reviewed as there are many data entries required to create Synchro models. Having origin-destination data of various movements would create a more accurate model. Keep in mind, the Synchro models I created are only a starting point to a potential solution.

**Problem #1:** SR-82 & Howe Road intersection during the PM peak hour (the AM peak hour intersection delay can be improved via signal retiming)

**Pertinent information #1:** Peak hour turning volumes as per the certified traffic (see below).

**Solution #1A:** Eliminate the NBL & NBT movements at 82/Howe and accommodate via a u-turn. This allows the NB phase to be eliminated, which allows more time for the other phases.

**Issues #1A:** Adding a u-turn at the adjacent intersection to the east (I-71 SB entrance/exit ramps), approximately 900 feet away from 82/Howe is not a good location to add the u-turn for the following reasons:

1. The intersection of SR-82 & I-71 SB entrance/exit ramps has 5,830 cars passing thru it. (EBT=2,030, WBT=1,400, SBR=1,850).
2. The existing signal at 82/71SB should be operating as a 2-phase signal
3. Adding the EBU (270 vehicles) movement at 82/71SB requires a 3<sup>rd</sup> phase to be added to the signal, which causes increased delays to the other movements (WBT=1,400, SBR=1,850).
4. The proper EBU turn lane cannot be accommodated unless the inside WBL (930 veh/hr) turn lane at 82/Howe is reduced significantly.
5. In summary, the heavy volumes of the WBT and SBR movements at 82/71SB and WBL at 82/Howe are impacted to accommodate the 270 vehicles making the U-turn.

**Solution #1B:** Eliminate the NBL & NBT movements at 82/Howe and accommodate via a u-turn at I-71 NB entrance/exit ramps. This solution appears to improve delays at all intersections along SR-82 (Howe, I-71 SB, I-71 NB)

**Issues #1B:** NB vehicles wishing to make a left or thru movement at 82/Howe will have to travel about 2,000 feet to the u-turn, then an additional 2,000 feet to get back to 82/Howe.

**Problem #2:** Excessive queues are caused by SR-82 EB to I-71 NB (1,690 veh/hr) traffic during the AM peak hour.

**Pertinent information #2:** Below are the peak hour turning volumes as per the certified traffic (see below).

**Solution #2:** Change the existing lane assignments for EB traffic at the SR-82 & I-71 NB intersection from (Thru|Thru|Right) to (Thru|Thru-Right|Right). This improves lane utilization and helps to move more EBT traffic at the 82/Howe and 82/71 SB intersections.

**Issues #2:** SR-82 EB to I-71 NB vehicle could occasionally be prevented from entering the ramp in the shared thru-right lane if traffic queues past the entry point of the ramp. This should rarely occur since the EB movement at the 82/I-71 NB intersection will be receiving a significant amount of green time.

**Comments:** This change is not required to accommodate the PM traffic; however, providing it does provide benefits.

The following Synchro were created:

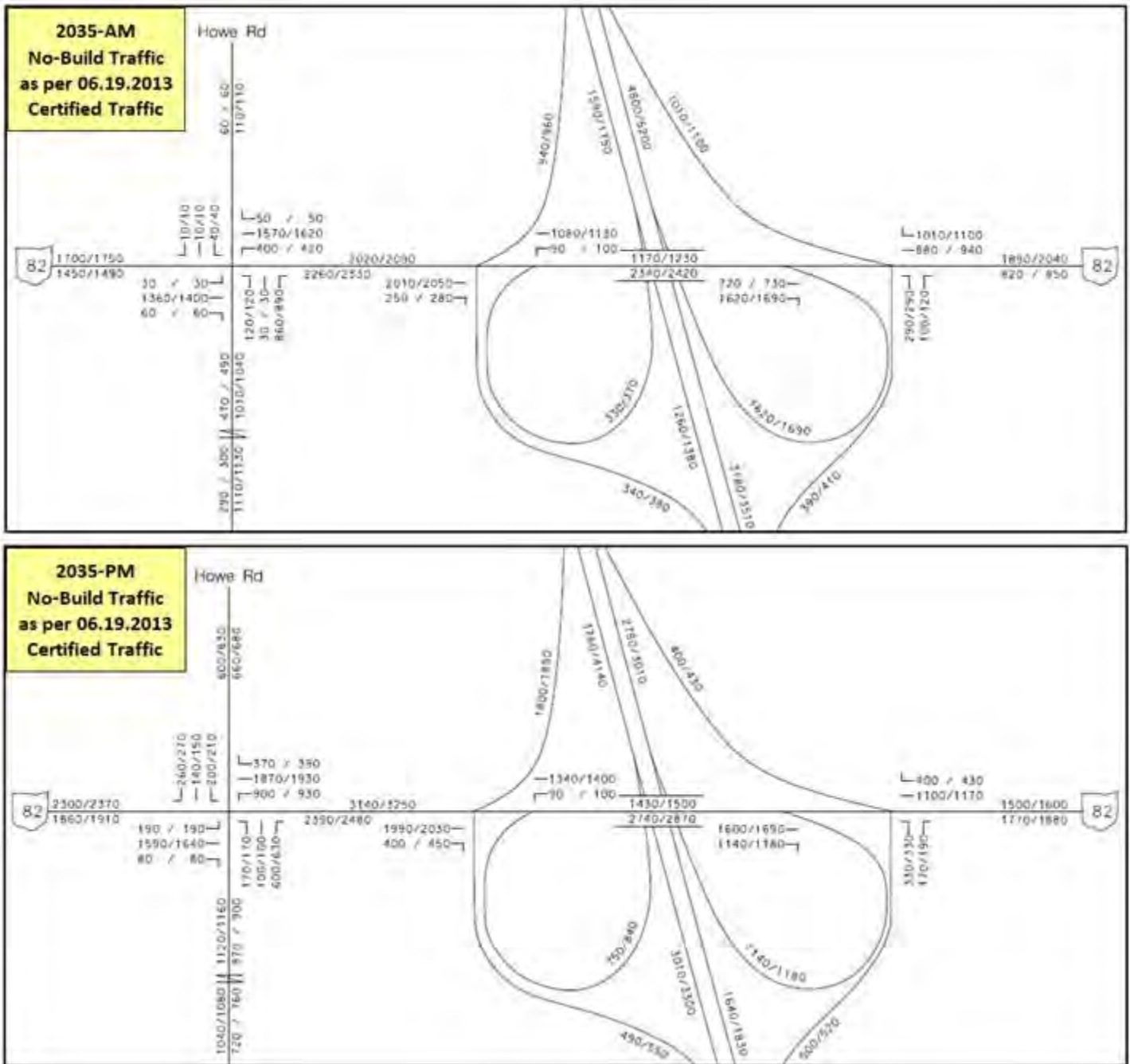
1. 2035 AM/PM – No-Build

2. 2035 AM/PM – EB u-turn at I-71 SB
3. 2035 AM/PM – EB u-turn at I-71 NB

Synchro models are located here:

O:\Roadway\Gary\CUY-71-2.57

Note, the I-71 NB exit ramp shows the lane assignments as (L|R) when they are actually (L|LR). The NB volumes are relatively low and the various numbers related to this ramp are actually better than shown.



Respectfully,

**Gary L. Harrington, P.E.**



**From:** Harrington, Gary

**Sent:** Friday, August 16, 2013 2:52 PM

**To:** Blayney, Brian

**Cc:** Bline, Michael (Michael.Bline@dot.state.oh.us); Cronebach, Mike; Kubek, Michael; Hazapis, Lou

**Subject:** CUY-71-2.57 at SR 82, PID UNPRG, Roadway Review, IMS

Brian – The Office of Roadway Engineering reviewed the subject report and offers the following comments:

Operations

1. A Feasibility Study should have been prepared prior to the submission of the IMS, which would include the selected alternative. The consultant may have determined the appropriate solution; however, we need to have the opportunity to review the alternatives they evaluated. For example, in my previous 2 reviews, I made the comment that the left-thru movements at 82/Howe should be restricted and accommodated with a U-turn. Looking at this further, I created a Synchro model, which seems to improve the 82/Howe intersection without the need to construct an additional exit ramp from I-71 SB. The consultant said they explored this option. I'm requesting they submit their analyses so I can review them.
2. How much involvement has your Environmental staff had with this project? I discussed with CO-Environmental (Larry Hoffman) and they have not seen anything on this. Taking a quick look at the project, Larry said it seems the environmental impacts would be minimal. He said a comparison between alternatives needs to be prepared that shows that includes costs (ROW, Utilities, etc.), impacts, improvements/benefits, etc.
3. Table of Contents – Environmental Overview is omitted
4. Pages 1-2, The schematic provided useful information (lane assignments, LOS, analysis ID). The analyses for intersections included the ID#, which was helpful when cross-referencing info related to a particular location. In the future, to improve the IMS, the consultant should provide the ID# on all other analyses (freeway segment, merge/diverge, etc.). Additionally, Figures 1-2 would provide more useful information if the LOS included the no-build and build for the AM/PM.
5. Page 3, Background – Include information on what short-term countermeasures the City of Strongsville have implemented.
6. Page 9, Alternatives Considered, #4 – A C-D road will not be dismissed alone based on costs. The Department would require a C-D road instead of introducing a weave to the interstate.
7. Page 9, Alternatives Considered, #5 – This office would like to review the consultants exploration of alternative intersections (roundabouts, CFI, median U-turn). The benefits/disadvantages of these alternatives along with costs should have been included in a comparison matrix as part of a feasibility study.
8. Page 12, SR-82 EB to I-71 NB, The consultant's preferred design, Option 3, seems to be the best design to accommodate SR-82 EB traffic. As previously commented on, I suggest retaining the larger entrance ramp radius to improve traffic flow.
9. Page 20, Constrained Analysis, This page can be removed because it is not required.
10. Appendix B, Build Condition Geometric Layout – This is not required as part of the IMS and should be removed.
11. Appendix C, Certified Traffic
  - a. Why are the traffic volumes different for SR-82 WB at I-71 SB between the no-build and build alternatives? I understand there could be some variation. Do the numbers correspond to the O-D study the consultant performed?
  - b. I understand the consultant's O-D study estimated approximately 20% the Howe SB traffic comes from I-71 SB; However, the certified traffic shows a 74%/77% (AM/PM) reduction in the AM/PM traffic when comparing the no-build to build condition.
12. Appendix D, Intersections, 2035 No Build Condition, AM
  - a. 02\_I-71 SB & SR-82, Synchro was used to analyze. The intersection needs to be balance within 3 seconds, if possible. A 2-phase operation should be looked at. Can the signal be more efficient if it is

phased as (WBL, WBT, NBR) and (EBT, EBR, SBR)? This comment, regarding balancing, applies to all other signals analyzed with Synchro.

- b. 03\_SR-82 & Howe – The EBL volume is 30. It seems this movement could be accommodated as permissive only, if there are not safety issues.
13. Appendix D, Intersections, 2035 No Build Condition, PM
- a. 03\_SR-82 & Howe – The NB/SB green time is 9.5 sec. The minimum for this needs to be 10 sec.
  - b. 04\_Pomeroy & Howe – The EB/WB green time is 8.5 sec. The minimum for this needs to be 10 sec.
14. Appendix D, Freeway Segments
- a. It would be useful if the analysis # from Figures 1-2 were included.
  - b. I-71 NB prior to the SR-303 EB to I-71 NB merge was analyzed (volume = 2640). This analysis is not required, the segment with the 3620 volume should have been analyzed. Same comment applies to PM.
  - c. The following segments need to be analyzed:
    - i. I-71 NB between (SR-82 EB to I-71 NB merge) and (SR-82 WB to I-71 NB merge), AM volume is 5200
    - ii. I-71 SB on the opposite side, AM volume is 1750
15. Appendix D, Freeway Merges/Diverges
- a. SR-303 EB to I-71 NB merge analysis is not required. This needs to be removed.
16. Appendix E, Turn Lane Calculations
- a. Howe @ SHurmer, NBT volume of 660 was used, volume of 1030 should be used.
17. Please have the consultant submit a written disposition to the comments above with the next submission.

#### Geometrics

##### Howe Rd./Shurmer Rd. Intersection

- 1.) It appears curve widening has not been provided on Curve #3 (Howe/Shurmer Exit Ramp). From Fig. 301-5c the curve widening needs to be 7.0 ft.
- 2.) Fig. 401-2 calls for a 1.6% or steeper drainage tangent to provide drainage away from the through road pavement. Only 0.38% is being proposed at the Howe Rd./Shurmer Rd. intersection.

##### EB SR 82 to NB IR 71 On-Ramp

- 3.) Curve #1 (EB SR 82 to NB IR 71) should have curve widening provided.
- 4.) The profile for SR 82 EB to IR 71 NB on ramp at Sta. 21+20 +/- appears to have a grade break at the location where the proposed profile meets the existing profile.

I will send a follow-up e-mail next week and include the Synchro files.

Respectfully,

**Gary L. Harrington, P.E.**

**Studies Engineer | Ohio Department of Transportation | Office of Roadway Engineering**  
**1980 West Broad Street | Mail Stop 1230 | Columbus, OH 43223**  
**614.387.5205 | [Gary.Harrington@dot.state.oh.us](mailto:Gary.Harrington@dot.state.oh.us)**

---

**From:** Blayney, Brian

**Sent:** Wednesday, July 31, 2013 4:15 PM

**To:** Harrington, Gary

**Cc:** Bline, Michael; Kubek, Michael; Hazapis, Lou; Cronebach, Mike

**Subject:** RE: Request to Review Interchange Modification Study, CUY-71-2.57 at SR 82, PID UNPRG

And now the attachment. Sorry, I must've been thinking about what's for dinner.

-----  
Brian Blayney, PE, Traffic Planning Engineer  
ODOT District 12 Planning Department  
5500 Transportation Blvd, Garfield Hts, OH 44125

Phone (216) 584-2102, Fax (216) 584-2279

e-mail: [Brian.Blayney@dot.state.oh.us](mailto:Brian.Blayney@dot.state.oh.us)

---

**From:** Blayney, Brian

**Sent:** Wednesday, July 31, 2013 4:13 PM

**To:** Harrington, Gary

**Cc:** Bline, Michael; Kubek, Michael; Hazapis, Lou; Cronebach, Mike

**Subject:** Request to Review Interchange Modification Study, CUY-71-2.57 at SR 82, PID UNPRG

Gary,

See attached request for subject review and link to digital files on ODOT network. Hard copy to follow under separate transmittal from HMM. I expect the City to resubmit an application for safety funding to implement this concept.

[Link to IMS Study Folder](#)

I have also copied Mike Cronebach (by email) for his input on the concept. Could you please coordinate his input with your review. Thanks.

Brian

-----  
Brian Blayney, PE, Traffic Planning Engineer  
ODOT District 12 Planning Department  
5500 Transportation Blvd, Garfield Hts, OH 44125  
Phone (216) 584-2102, Fax (216) 584-2279  
e-mail: [Brian.Blayney@dot.state.oh.us](mailto:Brian.Blayney@dot.state.oh.us)

## **Appendix F**

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### **ECAT Analysis with Existing Conditions**

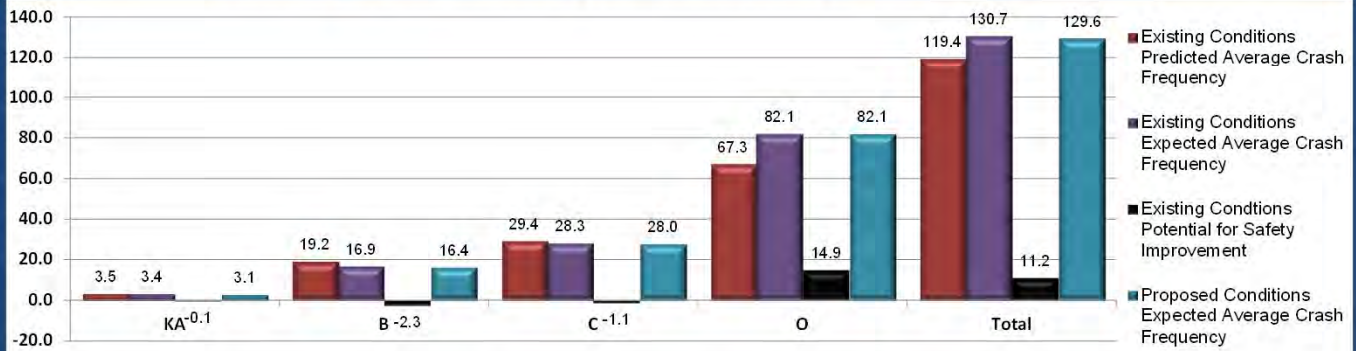


# Project Safety Performance Report

## General Information

Project Name	ODOT District 12 Safety Studies - CUY 82	Contact Email	WisorN@pbworld.com
Project Description		Contact Phone	614-791-5177
Reference Number		Date Performed	
Analyst	NRW	Analysis Year	2014
Agency/Company	Parsons Brinckerhoff		

## Summary of Anticipated Safety Performance of the Project (average crashes/year)



## Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
<b>N<sub>predicted</sub> - Existing Conditions</b>	3.5097	19.2206	29.4486	67.2686	119.4475
<b>N<sub>expected</sub> - Existing Conditions</b>	3.3653	16.8823	28.3132	82.1188	130.6796
<b>N<sub>potential for improvement</sub> - Existing Conditions</b>	-0.1444	-2.3383	-1.1354	14.8502	11.2321
<b>N<sub>expected</sub> - Proposed Conditions</b>	3.1091	16.4085	27.9619	82.1188	129.5983



# Project Safety Performance Report

## General Information

Project Name	ODOT District 12 Safety Studies - CUY 82	Contact Email	WisorN@pbworld.com
Project Description		Contact Phone	614-791-5177
Reference Number		Date Performed	
Analyst	NRW	Analysis Year	2014
Agency/Company	Parsons Brinckerhoff		

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
SR82: 2.8	Royalton Rd and Placid Cove Drive	0.6076	2.605	3.6654	11.5367	18.4147	
SR82: 2.93	Royalton Rd and Fallingwater Road	0.3439	1.5886	2.3141	7.2427	11.4893	
SR82: 3.03	Royalton Rd and Southpark Center Drive	0.5689	2.4436	3.442	10.7918	17.2463	
SR82: 3.22	Royalton Rd and Howe Road	0.6071	2.6318	3.7172	11.9299	18.886	
SR82: 3.38	I-71 Southbound Ramp and Royalton Rd	1.1022	7.9356	13.0058	11.4791	33.5227	
SR82: 3.62	I-71 Northbound Ramp and Royalton Rd	0.28	2.016	3.3041	14.2884	19.8885	

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
SR82: 2.8	Royalton Rd and Placid Cove Drive	0.5943	2.3299	2.8371	7.1511	12.9124	
SR82: 2.93	Royalton Rd and Fallingwater Road	0.343	1.4278	2.2539	7.8958	11.9205	
SR82: 3.03	Royalton Rd and Southpark Center Drive	0.5442	2.1138	3.3116	10.3903	16.3599	
SR82: 3.22	Royalton Rd and Howe Road	0.5929	2.7398	6.1721	24.0338	33.5386	
SR82: 3.38	I-71 Southbound Ramp and Royalton Rd	1.015	6.371	10.7073	22.2873	40.3806	
SR82: 3.62	I-71 Northbound Ramp and Royalton Rd	0.2759	1.9	3.0312	10.3605	15.5676	

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
SR82: 2.8	Royalton Rd and Placid Cove Drive	-0.0133	-0.2751	-0.8283	-4.3856	-5.5023	
SR82: 2.93	Royalton Rd and Fallingwater Road	-0.0009	-0.1608	-0.0602	0.6531	0.4312	
SR82: 3.03	Royalton Rd and Southpark Center Drive	-0.0247	-0.3298	-0.1304	-0.4015	-0.8864	
SR82: 3.22	Royalton Rd and Howe Road	-0.0142	0.108	2.4549	12.1039	14.6526	
SR82: 3.38	I-71 Southbound Ramp and Royalton Rd	-0.0872	-1.5646	-2.2985	10.8082	6.8579	
SR82: 3.62	I-71 Northbound Ramp and Royalton Rd	-0.0041	-0.116	-0.2729	-3.9279	-4.3209	

## Proposed Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
SR82: 2.8	Royalton Rd and Placid Cove Drive	0.5081	2.1719	2.7193	7.1511	12.5504	
SR82: 2.93	Royalton Rd and Fallingwater Road	0.3277	1.3977	2.2323	7.8958	11.8535	
SR82: 3.03	Royalton Rd and Southpark Center Drive	0.4639	1.9658	3.2017	10.3903	16.0217	
SR82: 3.22	Royalton Rd and Howe Road	0.5185	2.6021	6.0701	24.0338	33.2245	
SR82: 3.38	I-71 Southbound Ramp and Royalton Rd	1.015	6.371	10.7073	22.2873	40.3806	
SR82: 3.62	I-71 Northbound Ramp and Royalton Rd	0.2759	1.9	3.0312	10.3605	15.5676	

## Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0798	0.0795	-0.0003	0.0795
Head On	0.4932	0.4873	-0.0059	0.4873
Rear End	62.5100	77.0145	14.5045	77.0145
Backing	1.7576	1.6186	-0.1390	1.6186
Sideswipe - Meeting	1.6931	1.6739	-0.0192	1.6739
Sideswipe - Passing	10.7671	12.3092	1.5421	12.3092
Angle	20.5128	18.5673	-1.9455	18.5673
Parked Vehicle	1.4687	1.3782	-0.0905	1.3782
Pedestrian	1.3713	1.2073	-0.1640	0.1261
Animal	0.0000	0.0000	0.0000	0.0000
Train	0.0017	0.0016	-0.0001	0.0016
Pedalcycles	1.7560	1.4893	-0.2667	1.4893
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	2.8025	2.5760	-0.2265	2.5760
Other Object	0.1553	0.1540	-0.0013	0.1540
Overturning	0.3669	0.3576	-0.0093	0.3576
Other Non-Collision	0.2332	0.2294	-0.0038	0.2294
Left Turn	13.4782	11.5359	-1.9423	11.5359
Right Turn	0.0000	0.0000	0.0000	0.0000

## **Appendix G**

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### **Lane Utilization Factor Calculations**

**PARSONS  
BRINCKERHOFF** Computation Sheet

page 1 of 5 2072513  
made by JRL  
date 3-3-14  
checked by SJG  
date 3-10-14

subject Lane Utilization Factor Recommendations

Single Lane Loop\*  
(current condition)

EBT@ Howe  
0.50/0.70

EBT@ I-71 SB Ramps  
0.55/0.50

\*Source: TEC Signal Progression Study Synchro Model

Dual Lane Loop Entrance  
(merge on loop ramp)

0.80/0.91

0.71/0.91

AM/PM



subject AM Peak - 2 lane loop Calculation

EBT @ Howe

873 (to ramps) + 59 (to Howe) in right two lanes  $\Rightarrow$  466 highest lane volume

$$\text{Lane Utilization Factor} \Rightarrow \frac{1121}{3(466)} = 0.80$$

$$\begin{array}{r} 1062 \\ + 69 \\ \hline 1121 \end{array} \quad \begin{array}{r} 748 \\ + 125 \\ \hline 873 \end{array}$$

EBT @ I-71 SB

230 (I-71 SB) + 1373 (I-71 NB) in right two lanes  $\Rightarrow$  802 highest lane volume

$$\text{Lane Utilization Factor} \Rightarrow \frac{1717}{3(802)} = 0.71$$

Assumes even lane distribution prior to I-71 SB ramp that does not backfill due to curb lane eventually merging on ramp.

Lane Utilization Factor equation is from page 5-9 (99 of 560) of Synchro 8 user guide.

$$fLU = \frac{\text{Total Approach Volume}}{(\text{Number of Lanes} \times \text{High Lane Volume})}$$

fLU = Lane Utilization Factor

**PARSONS  
BRINCKERHOFF** Computation Sheet

page 3 of 5

20705B

made by JRL

date 3-3-14

checked by SJG

date 3-10-14

subject PM Peak - 2 lane loop calculation

The 3 lanes have 3 destinations. Lane 1 goes to I-71 SB (381) + I-71 NB (886). Lane 2 goes to I-71 NB + continues on SR-82 (964).

Assumes default Lane Utilization Factor for EBT @ Howe + I-71 SB ramps (0.91).

# PARSONS BRINCKERHOFF Computation Sheet

page 4 of 5 20725B  
 made by JRL  
 date 3-3-14  
 checked by SJG  
 date 3-10-14

subject AM Distribution

AM

662 (SB entrance)  
 -318  
 344

Costco → 39(2%)

7 → 188  
 → 149

34 → 937  
 → 746  
 → 5  
 125  
 100

7 → 59  
 → 846 (43.5%)  
 Howe

22 → 749  
 597

1717

344

1373

230

I-71 NB

I-71 SB

# PARSONS BRINCKERHOFF Computation Sheet

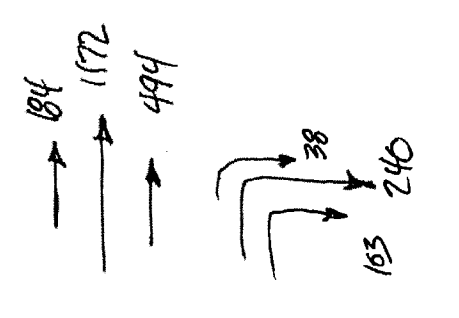
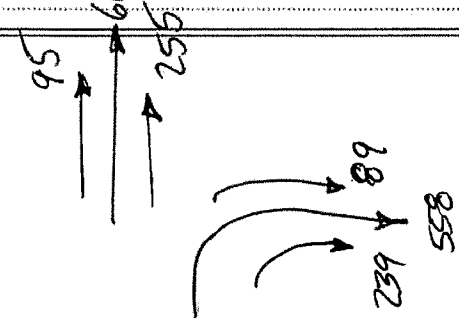
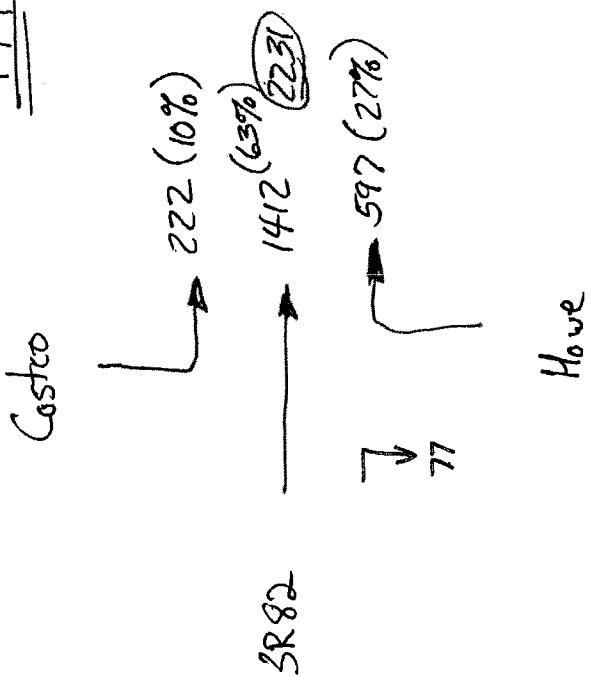
page 5 of 5 20725B  
 made by JRL  
 date 3-3-14  
 checked by SJG  
 date 3-10-14

subject

PM Distribution

PM

$$\begin{array}{r} 1665 \text{ SB entrance} \\ - 701 \\ \hline 964 \end{array}$$



## **Appendix H**

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### **Cost Analysis**

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate

Two-Lane Entrance Ramp from SR-82 EB to I-71 NB Entrance Ramp

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED DOLLARS *	TOTAL AMOUNT EST. DOLLARS
<b>ROADWAY</b>				
WALK REMOVED ***	SQ FT	1,412	\$ 1.75	\$ 2,471.00
EXCAVATION	CU YD	619	\$ 8.00	\$ 4,952.00
EMBANKMENT	CU YD	797	\$ 9.00	\$ 7,173.00
GUARDRAIL	FT	375	\$ 17.50	\$ 6,562.50
CLEARING & GRUBBING, MEDIUM	ACRE	1.07	\$ 2,500.00	\$ 2,675.00
			<b>\$</b>	<b>23,833.50</b>
<b>EROSION CONTROL</b>				
SEEDING & MULCHING	SQ YD	2,042	\$ 3.00	\$ 6,126.00
EROSION CONTROL - ITEM 832	EACH	8,000	\$ 1.00	\$ 8,000.00
EROSION CONTROL PLAN	-	LUMP	\$ 10,000.00	\$ 10,000.00
TOPSOIL ** -assume 6" per SQ YD seeding	CU YD	340	\$ 15.00	\$ 5,105.00
			<b>\$</b>	<b>29,231.00</b>
<b>STORM SEWER</b>				
CLOSED STORM SYSTEM ** -\$500 per foot of curbed road therefore \$250 per foot of widening -includes storm conduit type b or c, catch basins (No. 3A), and manholes.	FT	1,414	\$ 250.00	\$ 353,500.00
UNDERDRAINS - 6" unclassified pipe	FT	1,414	\$ 10.00	\$ 14,140.00
BMPs ** -assume that BMPs will be 5% of closed system cost.	-	LUMP	\$ 17,675.00	\$ 17,675.00
			<b>\$</b>	<b>385,315.00</b>
<b>SANITARY SEWER</b>				
Not anticipated	-	-	-	\$ -
			<b>\$</b>	<b>-</b>
<b>WATER WORKS</b>				
FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE***	EACH	0	\$ 2,528.70	\$ -
			<b>\$</b>	<b>-</b>
<b>PAVEMENT</b>				
4" Concrete Walk ***	SQ FT	1,412	\$ 4.75	\$ 6,707.00
CONCRETE (RAMPS) -13" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	2,690	\$ 68.00	\$ 182,920.00
FULL DEPTH PAVEMENT REMOVAL	SQ YD	902	\$ 8.00	\$ 7,216.00
			<b>\$</b>	<b>196,843.00</b>
<b>LIGHTING</b>				
CONTINUOUS ROADWAY LIGHTING - No change	FT	0	\$ 100.00	\$ -
			<b>\$</b>	<b>-</b>

Attributes

Acquisition	Unit (SF) or (Acreage)	Cost/Unit (\$\$/SF) (\$\$/Acre)	Subtotal Land Value	Structure Values (if Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted
-Residential	0	\$ 108,900.00	\$0	\$0	\$0	\$0.00	\$0.00	0	0	0	0
-Commercial	1.4	\$579,126.00	\$810,776	0	\$0	\$0.00	\$810,776.40	5	0	5	0
-Industrial	0	\$0.00	\$0	0	0	\$0.00	\$0.00	0	0	0	0
-Agricultural	0	\$0.00	\$0	0	0	\$0.00	\$0.00	0	0	0	0
<b>Relocation</b>	<b>Unit (Displacement)</b>	<b>*RHP/RSP</b>	<b>Move Cost</b>	<b>Reestablishment</b>	<b>Total Non Labor RAP Costs</b>	<b>Estimate amount of time necessary to relocate all RAP parcels = (months)</b>	<b>Estimate number of years until project wide R/W acquisition begins =</b>				
-Residential Owner Occupant Tenant	0	\$0	\$0		\$0						
-Commercial/Farm/NPO Owner Tenant	0	\$0	\$0		\$0						
-Personal Property	0	\$0	\$0		\$0						
(Total Cost of Acquisition Costs) (Total of Acquisition Costs) (Total of Acquisition Costs) (Total of Acquisition Costs) (Total of Acquisition Costs) (Total of Acquisition Costs)							\$285,798.68	\$1,096,575.08			

**Instruction for Acquisition & Relocation Cost Estimates**  
 Estimate the total number of acres involved in the project and allocate those acres into the four categories shown.  
 Assign an average unit price for each category. These unit prices are typically taken from the auditors tax card data. Cost Estimates prepared at Step 4 (Step 7 on Major Projects) and thereafter must base unit prices on a project sales data book instead of tax card data.  
 Add structure values from the auditors tax cards only if the structures are taken.  
 Damages must be assessed by a pre-qualified expert with experience in Before & After analysis. This usually occurs at Step 4 for Minor projects (Step 6 on Major Projects) and requires some knowledge of the impacts of the project on structures.  
 Relocation Cost Estimates must consider the complexity of the move process. All move estimates that involve a business or a multi-tenant residential structure should use the services of a relocation Assistance professional to accurately gauge costs.

**Instructions for Labor Cost Estimates**  
 Labor costs are a function of time, distance, and talent. Labor cost estimates should reflect the complexity of the project and the talent necessary to acquire the right of way in a timely manner. The person making the cost estimate may adjust the figures given for the particular project being estimated to reflect local labor costs. It is critical that the estimate be labeled to reflect the alignment alternative, the step in the PDP process and the person(s) performing the estimate.

**Comments**  
 Cost Per Acre per Cuyahoga Auditor's website April, 2014.

Macro View

Macro View	Unit (Parcels)	Unit Price	Total Cost
Titles	5	\$400	\$2,000
Appraisal -Simple	0	\$750	\$0
-Detailed	5	\$4,500	\$22,500
Appraisal Review -Simple	0	\$500	\$0
-Detailed	5	\$2,000	\$10,000
Negotiations	5	\$1,100	\$5,500
Relocations -Personal Property	0	\$1,500	\$0
-Residential	0	\$5,200	\$0
-Commercial/Farm/NPO	0	\$5,600	\$0
Closings	5	\$400	\$2,000
Project Management	5	\$550	\$2,750
Asbestos Testing & Abatement	5	\$0	\$0
<b>Total Labor Costs</b>			<b>\$44,750</b>

This R/W Cost Estimate Prepared by	Date
B. MacMillan	11/21/2014

This R/W Cost Estimate was performed at Step Safety Study of the PDP for Projects using

Total Labor Costs	\$44,750.00
Total Non Labor R/W Costs	\$1,096,575.08
Inflation Adjustments	
<b>Total R/W Costs</b>	<b>\$1,141,325</b>

**P.D.P. R/W Cost Estimator**

\*NPO = Non-Profit Organization

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Two-Lane Entrance Ramp from SR-82 EB to I-71 NB Entrance Ramp

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED DOLLARS *	TOTAL AMOUNT EST. DOLLARS
<b>TRAFFIC CONTROL &amp; SIGNALS</b>				
SIGNS	MILE	0.47	\$ 350,000.00	\$ 164,500.00
PAVEMENT MARKINGS - Edge Line	MILE	0.27	\$ 5,000.00	\$ 1,350.00
PAVEMENT MARKINGS - Lane Line	MILE	0.27	\$ 3,000.00	\$ 810.00
PAVEMENT MARKINGS - Center Line	MILE	0	\$ 6,000.00	\$ -
MAJOR URBAN TRAFFIC SIGNAL -4 poles, 8 signal heads, 1 controller -cable, loop detectors, conduit	EACH	0	\$ 300,000.00	\$ -
			<b>\$</b>	<b>166,660.00</b>
<b>RETAINING WALLS</b>				
RETAINING WALLS	SQFT	0	\$ -	\$ -
			<b>\$</b>	<b>-</b>
<b>MAINTENANCE OF TRAFFIC</b>				
MAINTAINING TRAFFIC -assume 10% of Pavement Total	-	LUMP	\$ 19,684.30	\$ 19,684.30
			<b>\$</b>	<b>19,684.30</b>
<b>RIGHT OF WAY</b>				
RIGHT OF WAY ** - Limits within LA - No ROW anticipated	ACRE	0	\$ -	\$ -
			<b>\$</b>	<b>-</b>
<b>MISCELLANEOUS</b>				
CONSTRUCTION LAYOUT STAKES	EACH	1	\$ 11,000.00	\$ 11,000.00
			<b>\$</b>	<b>11,000.00</b>
<b>TOTAL ALL SECTIONS:</b>				<b>\$ 832,567</b>
<b>PRELIMINARY ENGINEERING:</b>				<b>\$ 24,977</b>
<b>DETAILED DESIGN:</b>				<b>\$ 58,280</b>
<b>ROW:</b>				<b>\$ -</b>
<b>FIELD OFFICE Type A ( 8 Mo. ):</b>				<b>\$ 9,208</b>
<b>MOBILIZATION:</b>				<b>\$ 20,000</b>
<b>SUBTOTAL ALL SECTIONS:</b>				<b>\$ 945,031</b>
<b>CONTINGENCY (35% OF SUBTOTAL):</b>				<b>\$ 330,761</b>
<b>GRAND TOTAL:</b>				<b>\$ 1,275,792</b>
*Per ODOT Procedures for Budget Estimate Spreadsheet, May 2013 unless noted otherwise.				
** As noted.				
***Average Awarded Bid, 2013 ODOT Bid Tabs.				
Utility relocation costs not included.				
	Calculated:	BLM	Date:	4/11/2014
	Checked	SJG	Date:	4/14/2014



Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Traditional Widening at SR-82 and Howe Road Intersection

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED * DOLLARS	TOTAL AMOUNT EST. DOLLARS
<b>ROADWAY</b>				
WALK REMOVED ***	SQ FT	32,783	\$ 1.75	\$ 57,370.25
EXCAVATION	CU YD	8,194	\$ 8.00	\$ 65,552.00
EMBANKMENT	CU YD	1,214	\$ 9.00	\$ 10,926.00
GUARDRAIL	FT	500	\$ 17.50	\$ 8,750.00
CLEARING & GRUBBING, MEDIUM	ACRE	3.86	\$ 2,500.00	\$ 9,650.00
			<b>\$</b>	<b>152,248.25</b>
<b>EROSION CONTROL</b>				
SEEDING & MULCHING	SQ YD	6,105	\$ 3.00	\$ 18,315.00
EROSION CONTROL - ITEM 832	EACH	8,000	\$ 1.00	\$ 8,000.00
EROSION CONTROL PLAN	-	LUMP	\$ 20,000.00	\$ 20,000.00
TOPSOIL ** -assume 6" per SQ YD seeding	CU YD	1,018	\$ 15.00	\$ 15,262.50
			<b>\$</b>	<b>61,577.50</b>
<b>STORM SEWER</b>				
CLOSED STORM SYSTEM ** -\$500 per foot of curbed road therefore \$250 per foot of widening -includes storm conduit type b or c, catch basins (No. 3A), and manholes.	FT	4,736	\$ 250.00	\$ 1,184,000.00
UNDERDRAINS - 6" unclassified pipe	FT	4,736	\$ 10.00	\$ 47,360.00
BMPs ** -assume BMPs will be 5% of closed system cost.	-	LUMP	\$ 59,200.00	\$ 59,200.00
			<b>\$</b>	<b>1,290,560.00</b>
<b>SANITARY SEWER</b>				
Not anticipated	-	-	-	\$ -
			<b>\$</b>	<b>-</b>
<b>WATER WORKS</b>				
FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE***	EACH	1	\$ 2,528.70	\$ 2,528.70
			<b>\$</b>	<b>2,528.70</b>
<b>PAVEMENT</b>				
4" Concrete Walk ***	SQ FT	32,783	\$ 4.75	\$ 155,719.25
CONCRETE (NON-MAINLINE LANES SR-82) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	6,764	\$ 59.00	\$ 399,076.00
CONCRETE (NON-MAINLINE LANES HOWE ROAD) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	949	\$ 59.00	\$ 55,991.00
CONCRETE (NON-MAINLINE LANES OTHER SIDE STREETS & DRIVES) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	1,758	\$ 59.00	\$ 103,722.00
FULL DEPTH PAVEMENT REMOVAL -side streets at intersection with SR-82	SQ YD	1,891	\$ 8.00	\$ 15,128.00
			<b>\$</b>	<b>729,636.25</b>
<b>LIGHTING</b>				
CONTINUOUS ROADWAY LIGHTING	FT	4,736	\$ 100.00	\$ 473,600.00
			<b>\$</b>	<b>473,600.00</b>

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Traditional Widening at SR-82 and Howe Road Intersection

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED * DOLLARS	TOTAL AMOUNT EST. DOLLARS
<b>TRAFFIC CONTROL &amp; SIGNALS</b>				
SIGNS	MILE	0.90	\$ 350,000.00	\$ 315,000.00
PAVEMENT MARKINGS - Edge Line	MILE	0.04	\$ 5,000.00	\$ 209.28
PAVEMENT MARKINGS - Lane Line	MILE	0.97	\$ 3,000.00	\$ 2,910.00
PAVEMENT MARKINGS (Other) - Center Line, (Crosswalk, Channelizing, etc.)	MILE	1.30	\$ 6,000.00	\$ 7,800.00
MAJOR URBAN TRAFFIC SIGNAL -4 poles, 8 signal heads, 1 controller -cable, loop detectors, conduit	EACH	6	\$ 300,000.00	\$ 1,800,000.00
			<b>\$</b>	<b>2,125,919.28</b>
<b>RETAINING WALLS</b>				
RETAINING WALLS	SQFT	0		
			<b>\$</b>	<b>-</b>
<b>MAINTENANCE OF TRAFFIC</b>				
MAINTAINING TRAFFIC -assume 10% of Pavement Total	-	LUMP	\$ 72,963.63	\$ 72,963.63
			<b>\$</b>	<b>72,963.63</b>
<b>RIGHT OF WAY</b>				
RIGHT OF WAY** - Per P.D.P. R/W Cost Estimator	ACRE	3.1	\$ 736,156.77	\$ 2,282,086.00
			<b>\$</b>	<b>2,282,086.00</b>
<b>MISCELLANEOUS</b>				
CONSTRUCTION LAYOUT STAKES	EACH	1	\$ 11,000.00	\$ 11,000.00
			<b>\$</b>	<b>11,000.00</b>
<b>TOTAL ALL SECTIONS:</b>				<b>\$ 4,920,034</b>
<b>TOTAL RAMP WIDENING:</b>				<b>\$ 832,567</b>
<b>PRELIMINARY ENGINEERING:</b>				<b>\$ 172,578</b>
<b>DETAILED DESIGN:</b>				<b>\$ 402,682</b>
<b>ROW:</b>				<b>\$ 2,282,086</b>
<b>FIELD OFFICE Type B ( 12 Mo. ):</b>				<b>\$ 17,700</b>
<b>MOBILIZATION:</b>				<b>\$ 200,000</b>
<b>SUBTOTAL ALL SECTIONS:</b>				<b>\$ 8,827,646</b>
<b>CONTINGENCY (35% OF SUBTOTAL):</b>				<b>\$ 3,089,676</b>
<b>GRAND TOTAL:</b>				<b>\$ 11,917,323</b>
*Per ODOT Procedures for Budget Estimate Spreadsheet, May 2013 unless noted otherwise.				
** As noted.				
*** Average Awarded Bid, 2013 ODOT Bid Tabs.				
Utility relocation costs not included.				
	Calculated:	BLM	Date:	4/11/2014
	Checked	SJG	Date:	4/14/2014

PID County Route Section 2.93

Traditional Widening at SR-82 and Howe Road Intersection

Macro View

Acquisition	Unit (SF) or (Acreage)	Cost/Unit (\$\$/SF) (\$\$/Acre)	Subtotal Land Value	Structure Values (if Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted
-Residential	0.3	X \$108,900.00	\$32,670	\$0	\$0	\$0.00	\$32,670.00	1	0	1	0
-Commercial	2.8	X \$579,126.00	\$1,621,553	0	\$0	\$0.00	\$1,621,552.80	4	0	4	0
-Industrial	0	X \$0.00	\$0	0	0	\$0.00	\$0.00	0	0	0	0
-Agricultural	0	X \$0.00	\$0	0	0	\$0.00	\$0.00	0	0	0	0
<b>Relocation</b>	<b>Unit (Displacement)</b>	<b>*RHP*/RSP</b>	<b>Move Cost</b>	<b>+</b>	<b>Reestablishment</b>	<b>=</b>	<b>Total Non Labor RAP Costs</b>	Estimate amount of time necessary to relocate all RAP parcels = (months)			
-Residential Owner Occupant Tenant	0	X \$0	\$0	+		=	\$0	Estimate number of years until project wide R/W acquisition begins =			
-Commercial/Farm/NPO Owner Tenant	0	X \$0	\$0	+	\$0	=	\$0				
-Personal Property	0	X \$0	\$0	+	\$0	=	\$0				
(((Total Cost of Acquisition Cost)x0.90)x0.025)+(((Total of Acquisition Cost)x0.10)x1.50) = Contingency							\$583,113.54				
							\$2,237,336.34				

**Instruction for Acquisition & Relocation Cost Estimates**  
 Estimate the total number of acres involved in the project and allocate those acres into the four categories shown.  
 Assign an average unit price for each category. These unit prices are typically taken from the auditors tax card data. Cost Estimates prepared at Step 4 (Step 7 on Major Projects) and thereafter must base unit prices on a project sales data book instead of tax card data.  
 Add structure values from the auditors tax cards only if the structures are taken.  
 Damages must be assessed by a pre-qualified expert with experience in Before & Alter analysis. This usually occurs at Step 4 for Minor projects (Step 6 on Major Projects) and requires some knowledge of the impacts of the project on structures.  
 Relocation Cost Estimates must consider the complexity of the move process. All move estimates that involve a business or a multi-tenant residential structure should use the services of a relocation Assistance professional to accurately gauge costs.

**Instructions for Labor Cost Estimates**  
 Labor costs are a function of time, distance, and talent. Labor cost estimates should reflect the complexity of the project and the talent necessary to acquire the right of way in a timely manner. The person making the cost estimate may adjust the figures given for the particular project being estimated to reflect local labor costs. It is critical that the estimate be labeled to reflect the alignment alternative, the step in the PDP process and the person(s) performing the estimate.

**Comments**  
 Cost Per Acre per Cuyahoga Auditor's website April, 2014.

Macro View

Labor (External)	Unit (Parcels)	Unit Price	Total Cost
Titles	5	\$400	\$2,000
Appraisal			
-Simple	0	\$750	\$0
-Detailed	5	\$4,500	\$22,500
Appraisal Review			
-Simple	0	\$500	\$0
-Detailed	5	\$2,000	\$10,000
Negotiations	5	\$1,100	\$5,500
Relocations			
-Personal Property	0	\$1,500	\$0
-Residential	0	\$5,200	\$0
-Commercial/Farm/NPO	0	\$5,600	\$0
Closings	5	\$400	\$2,000
Project Management	5	\$550	\$2,750
Asbestos Testing & Abatement	X		\$0
<b>Total Labor Costs</b>			<b>\$44,750</b>

**This R/W Cost Estimate Prepared by**  
 S. Gage  
 Date: 4/11/2014  
 This R/W Cost Estimate was performed at Step Safety Study of the PDP for Projects using

<b>Total Labor Costs</b>	\$44,750.00
<b>Total Non Labor R/W Costs</b>	\$2,237,336.34
<b>Inflation Adjustments</b>	
<b>Total R/W Costs</b>	<b>\$2,282,086</b>

P.D.P. R/W Cost Estimator

\*NPO = Non-Profit Organization

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Median U-Turn ( Roundabout ) at SR-82 and Howe Road Intersection

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED * DOLLARS	TOTAL AMOUNT EST. DOLLARS
<b>ROADWAY</b>				
WALK REMOVED ***	SQ FT	11,139	\$ 1.75	\$ 19,493.25
EXCAVATION	CU YD	7,736	\$ 8.00	\$ 61,888.00
EMBANKMENT	CU YD	2,734	\$ 9.00	\$ 24,606.00
GUARDRAIL	FT	156	\$ 17.50	\$ 2,730.00
CLEARING & GRUBBING, MEDIUM	ACRE	3.40	\$ 2,500.00	\$ 8,500.00
			<b>\$</b>	<b>117,217.25</b>
<b>EROSION CONTROL</b>				
SEEDING & MULCHING	SQ YD	3,323	\$ 3.00	\$ 9,969.00
EROSION CONTROL - ITEM 832	EACH	8,000	\$ 1.00	\$ 8,000.00
EROSION CONTROL PLAN	-	LUMP	\$ 20,000.00	\$ 20,000.00
TOPSOIL ** -assume 6" per SQ YD seeding	CU YD	554	\$ 15.00	\$ 8,307.50
			<b>\$</b>	<b>46,276.50</b>
<b>STORM SEWER</b>				
CLOSED STORM SYSTEM ** -\$500 per foot of curbed road therefore \$250 per foot of widening -includes storm conduit type b or c, catch basins (No. 3A), and manholes.	FT	2,551	\$ 250.00	\$ 637,750.00
UNDERDRAINS - 6" unclassified pipe	FT	2,551	\$ 10.00	\$ 25,510.00
BMPs ** -assume that BMPs will be 5% of closed system cost.	-	LUMP	\$ 31,887.50	\$ 31,887.50
			<b>\$</b>	<b>695,147.50</b>
<b>SANITARY SEWER</b>				
Not anticipated	-	-	-	\$ -
			<b>\$</b>	<b>-</b>
<b>WATER WORKS</b>				
FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE***	EACH	1	\$ 2,528.70	\$ 2,528.70
			<b>\$</b>	<b>2,528.70</b>
<b>PAVEMENT</b>				
4" Concrete Walk ***	SQ FT	11,139	\$ 4.75	\$ 52,910.25
CONCRETE (NON-MAINLINE LANES SR-82) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	520	\$ 59.00	\$ 30,680.00
CONCRETE (NON-MAINLINE LANES HOWE RD) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	4,528	\$ 59.00	\$ 267,152.00
CONCRETE (NON-MAINLINE LANES HOWE RD EXT.) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	3,897	\$ 59.00	\$ 229,923.00
FULL DEPTH PAVEMENT REMOVAL	SQ YD	7,069	\$ 8.00	\$ 56,552.00
			<b>\$</b>	<b>584,307.00</b>
<b>LIGHTING</b>				
CONTINUOUS ROADWAY LIGHTING	FT	2,551	\$ 100.00	\$ 255,100.00
			<b>\$</b>	<b>255,100.00</b>

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Median U-Turn ( Roundabout ) at SR-82 and Howe Road Intersection

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED * DOLLARS	TOTAL AMOUNT EST. DOLLARS
<b>TRAFFIC CONTROL &amp; SIGNALS</b>				
SIGNS	MILE	0.48	\$ 350,000.00	\$ 169,100.38
PAVEMENT MARKINGS (Other) - Crosswalk, Channelizing, etc.	MILE	0.27	\$ 6,000.00	\$ 1,620.00
PAVEMENT MARKINGS - Lane Line	MILE	0.46	\$ 3,000.00	\$ 1,380.00
PAVEMENT MARKINGS - Center Line	MILE	0.43	\$ 6,000.00	\$ 2,580.00
MAJOR URBAN TRAFFIC SIGNAL -4 poles, 8 signal heads, 1 controller -cable, loop detectors, conduit	EACH	1	\$ 300,000.00	\$ 300,000.00
			<b>\$</b>	<b>474,680.38</b>
<b>RETAINING WALLS</b>				
RETAINING WALLS - MSE	SQFT	925	\$ 160.00	\$ 148,000.00
			<b>\$</b>	<b>148,000.00</b>
<b>MAINTENANCE OF TRAFFIC</b>				
MAINTAINING TRAFFIC -assume 10% of Pavement Total	-	LUMP	\$ 58,430.70	\$ 58,430.70
			<b>\$</b>	<b>58,430.70</b>
<b>RIGHT OF WAY</b>				
RIGHT OF WAY** - Per P.D.P. R/W Cost Estimator	ACRE	2	\$ 854,868.00	\$ 1,709,736.00
			<b>\$</b>	<b>1,709,736.00</b>
<b>MISCELLANEOUS</b>				
CONSTRUCTION LAYOUT STAKES	EACH	1	\$ 11,000.00	\$ 11,000.00
			<b>\$</b>	<b>11,000.00</b>
<b>TOTAL ALL SECTIONS:</b>				<b>\$ 2,392,688</b>
<b>TOTAL RAMP WIDENING:</b>				<b>\$ 832,567</b>
<b>PRELIMINARY ENGINEERING:</b>				<b>\$ 96,758</b>
<b>DETAILED DESIGN:</b>				<b>\$ 225,768</b>
<b>ROW:</b>				<b>\$ 1,709,736</b>
<b>FIELD OFFICE Type B *** (12 Mo.):</b>				<b>\$ 17,700</b>
<b>MOBILIZATION:</b>				<b>\$ 200,000</b>
<b>SUBTOTAL ALL SECTIONS:</b>				<b>\$ 5,475,216</b>
<b>CONTINGENCY (35% OF SUBTOTAL):</b>				<b>\$ 1,916,326</b>
<b>GRAND TOTAL:</b>				<b>\$ 7,391,542</b>
*Per ODOT Procedures for Budget Estimate Spreadsheet, May 2013 unless noted otherwise.				
** As noted.				
***Average Awarded Bid, 2013 ODOT Bid Tabs.				
Utility relocation costs not included.				
	Calculated:	BLM	Date:	4/11/2014
	Checked:	SJG	Date:	4/14/2014

Median U-Turn (Roundabout) at SR-82 and Howe Road Intersection

2.93

Section

82

Route

CUY

County

PID

Macro View

Acquisition	Unit (SF) or (Acreage)	Cost/Unit (\$\$/SF) (\$\$/Acre)	Subtotal Land Value	Structure Values (if Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted
-Residential	0	X \$108,900.00	\$0	\$0	\$0	\$0.00	\$0.00	0	0	0	0
-Commercial	2.0	X \$579,126.00	\$1,158,252	0	\$0	\$0.00	\$1,158,252.00	16	0	16	0
-Industrial	0	X \$0.00	\$0	0	0	\$0.00	\$0.00	0	0	0	0
-Agricultural	0	X \$0.00	\$0	0	0	\$0.00	\$0.00	0	0	0	0
<b>Relocation</b>	<b>Unit (Displacement)</b>	<b>*RHP/*RSP</b>	<b>Move Cost</b>	<b>Reestablishment</b>	<b>Total Non Labor RAP Costs</b>	<b>Estimate amount of time necessary to relocate all RAP parcels = (months)</b>	<b>Estimate number of years until project wide R/W acquisition begins =</b>				
-Residential Owner Occupant Tenant	0	X \$0	\$6,000		\$0		\$0				
-Commercial/Farm/NPO Owner Tenant	0	X \$0	\$1,750		\$0		\$0				
-Personal Property	0	X \$1,000			\$0		\$0				
((Total Cost of Acquisition Cost)x0.90)x0.025+(((Total of Acquisition Cost)x0.10)x1.50) = Contingency Contingency (Incidentals, Admin, Review & Appropriation) <b>Total Non Labor R/W Costs</b>											
							\$408,283.83				
							\$1,566,535.83				

**Instruction for Acquisition & Relocation Cost Estimates**

Estimate the total number of acres involved in the project and allocate those acres into the four categories shown.

Assign an average unit price for each category. These unit prices are typically taken from the auditors tax card data. Cost Estimates prepared at Step 4 (Step 7 on Major Projects) and thereafter must base unit prices on a project sales data book instead of tax card data.

Add structure values from the auditors tax cards only if the structures are taken.

Damages must be assessed by a pre-qualified expert with experience in Before & Alter analysis. This usually occurs at Step 4 for Minor projects (Step 6 on Major Projects) and requires some knowledge of the impacts of the project on structures.

Relocation Cost Estimates must consider the complexity of the move process. All move estimates that involve a business or a multi-tenant residential structure should use the services of a relocation Assistance professional to accurately gauge costs.

**Instructions for Labor Cost Estimates**

Labor costs are a function of time, distance, and talent. Labor costs estimates should reflect the complexity of the project and the talent necessary to acquire the right of way in a timely manner. The person making the cost estimate may adjust the figures given for the particular project being estimated to reflect local labor costs. It is critical that the estimate be labeled to reflect the alignment alternative, the step in the PDP process and the person(s) performing the estimate.

**Comments**

Cost Per Acre per Cuyahoga Auditor's website April, 2014.

Macro View

Labor (External)	Unit (Parcels)	Unit Price	Total Cost
Titles	16	X \$400	\$6,400
Appraisal -Simple -Detailed	0	X \$750	\$0
Appraisal Review -Simple -Detailed	16	X \$4,500	\$72,000
Negotiations	0	X \$500	\$0
Relocations -Personal Property -Residential -Commercial/Farm/NPO	16	X \$2,000	\$32,000
Closings	16	X \$1,100	\$17,600
Project Management	0	X \$1,500	\$0
Asbestos Testing & Abatement	0	X \$5,200	\$0
	0	X \$5,600	\$0
	16	X \$400	\$6,400
	16	X \$550	\$8,800
	X		\$0
<b>Total Labor Costs</b>			<b>\$143,200</b>

**This R/W Cost Estimate Prepared by**

S. Gage

This R/W Cost Estimate was performed at Step \_\_\_\_\_ of the PDP for \_\_\_\_\_ Projects using \_\_\_\_\_

Date: 4/11/2014

Safety Study

<b>Total Labor Costs</b>	\$143,200.00
<b>Total Non Labor R/W Costs</b>	\$1,566,535.83
<b>Inflation Adjustments (2013)</b>	\$0.00
<b>Total R/W Costs</b>	<b>\$1,709,736</b>

P.D.P. R/W Cost Estimator

\*NPO = Non-Profit Organization

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Modified Traditional Widening at SR-82 and Howe Road Intersection

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED * DOLLARS	TOTAL AMOUNT EST. DOLLARS
<b>ROADWAY</b>				
WALK REMOVED ***	SQ FT	22,481	\$ 1.75	\$ 39,341.75
EXCAVATION	CU YD	5,642	\$ 8.00	\$ 45,136.00
EMBANKMENT	CU YD	1,214	\$ 9.00	\$ 10,926.00
GUARDRAIL	FT	500	\$ 17.50	\$ 8,750.00
CLEARING & GRUBBING, MEDIUM	ACRE	2.63	\$ 2,500.00	\$ 6,575.00
			<b>\$</b>	<b>110,728.75</b>
<b>EROSION CONTROL</b>				
SEEDING & MULCHING	SQ YD	4,338	\$ 3.00	\$ 13,014.00
EROSION CONTROL - ITEM 832	EACH	8,000	\$ 1.00	\$ 8,000.00
EROSION CONTROL PLAN	-	LUMP	\$ 20,000.00	\$ 20,000.00
TOPSOIL ** -assume 6" per SQ YD seeding	CU YD	723	\$ 15.00	\$ 10,845.00
			<b>\$</b>	<b>51,859.00</b>
<b>STORM SEWER</b>				
CLOSED STORM SYSTEM ** -\$500 per foot of curbed road therefore \$250 per foot of widening -includes storm conduit type b or c, catch basins (No. 3A), and manholes.	FT	3,707	\$ 250.00	\$ 926,750.00
UNDERDRAINS - 6" unclassified pipe	FT	3,707	\$ 10.00	\$ 37,070.00
BMPs ** -assume BMPs will be 5% of closed system cost.	-	LUMP	\$ 46,337.50	\$ 46,337.50
			<b>\$</b>	<b>1,010,157.50</b>
<b>SANITARY SEWER</b>				
Not anticipated	-	-	-	\$ -
			<b>\$</b>	<b>-</b>
<b>WATER WORKS</b>				
FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE***	EACH	0	\$ 2,528.70	\$ -
			<b>\$</b>	<b>-</b>
<b>PAVEMENT</b>				
4" Concrete Walk ***	SQ FT	22,481	\$ 4.75	\$ 106,784.75
CONCRETE (NON-MAINLINE LANES SR-82) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	5,311	\$ 59.00	\$ 313,349.00
CONCRETE (NON-MAINLINE LANES OTHER SIDE STREETS & DRIVES) -9" Reinf. Concrete -6" Aggregate Base -Subgrade Compaction	SQ YD	1,678	\$ 59.00	\$ 99,002.00
FULL DEPTH PAVEMENT REMOVAL -side streets at intersection with SR-82	SQ YD	1,466	\$ 8.00	\$ 11,728.00
			<b>\$</b>	<b>530,863.75</b>
<b>LIGHTING</b>				
CONTINUOUS ROADWAY LIGHTING	FT	3,707	\$ 100.00	\$ 370,700.00
			<b>\$</b>	<b>370,700.00</b>

Appendix H - Cost Analysis  
 CUY-82-2.93 Safety Study  
 C1 Estimate  
 Modified Traditional Widening at SR-82 and Howe Road Intersection

ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE ESTIMATED * DOLLARS	TOTAL AMOUNT EST. DOLLARS
<b>TRAFFIC CONTROL &amp; SIGNALS</b>				
SIGNS	MILE	0.70	\$ 350,000.00	\$ 245,000.00
PAVEMENT MARKINGS - Edge Line	MILE	0.04	\$ 5,000.00	\$ 209.28
PAVEMENT MARKINGS - Lane Line	MILE	0.62	\$ 3,000.00	\$ 1,860.00
PAVEMENT MARKINGS (Other) - Center Line, (Crosswalk, Channelizing, etc.)	MILE	0.75	\$ 6,000.00	\$ 4,500.00
MAJOR URBAN TRAFFIC SIGNAL -4 poles, 8 signal heads, 1 controller -cable, loop detectors, conduit	EACH	6	\$ 300,000.00	\$ 1,800,000.00
			<b>\$</b>	<b>2,051,569.28</b>
<b>RETAINING WALLS</b>				
RETAINING WALLS	SQFT	0		
			<b>\$</b>	<b>-</b>
<b>MAINTENANCE OF TRAFFIC</b>				
MAINTAINING TRAFFIC -assume 10% of Pavement Total	-	LUMP	\$ 53,086.38	\$ 53,086.38
			<b>\$</b>	<b>53,086.38</b>
<b>RIGHT OF WAY</b>				
RIGHT OF WAY** - Per P.D.P. R/W Cost Estimator	ACRE	1.4	\$ 815,232.14	\$ 1,141,325.00
			<b>\$</b>	<b>1,141,325.00</b>
<b>MISCELLANEOUS</b>				
CONSTRUCTION LAYOUT STAKES	EACH	1	\$ 11,000.00	\$ 11,000.00
			<b>\$</b>	<b>11,000.00</b>
<b>TOTAL ALL SECTIONS:</b>				<b>\$ 4,189,965</b>
<b>PRELIMINARY ENGINEERING:</b>				<b>\$ 125,699</b>
<b>DETAILED DESIGN:</b>				<b>\$ 293,298</b>
<b>ROW:</b>				<b>\$ 1,141,325</b>
<b>FIELD OFFICE Type B ( 12 Mo. ):</b>				<b>\$ 17,700</b>
<b>MOBILIZATION:</b>				<b>\$ 200,000</b>
<b>SUBTOTAL ALL SECTIONS:</b>				<b>\$ 5,967,986</b>
<b>CONTINGENCY (35% OF SUBTOTAL):</b>				<b>\$ 2,088,795</b>
<b>GRAND TOTAL:</b>				<b>\$ 8,056,781</b>
*Per ODOT Procedures for Budget Estimate Spreadsheet, May 2013 unless noted otherwise.				
** As noted.				
*** Average Awarded Bid, 2013 ODOT Bid Tabs.				
Utility relocation costs not included.				
	Calculated:	BLM	Date:	11/18/2014
	Checked	SJG	Date:	11/20/2014



## **Appendix I**

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### **Traditional Widening Analysis with Dual Westbound Left Turn Lanes at Howe Road**

A Synchro capacity analysis was performed to evaluate the benefits of improving the lane utilization along SR-82 eastbound and the traditional widening at Howe Road using the existing volumes for the AM and PM peak periods. The revised lane utilization factors were used in the analysis. Table 1 summarizes the Synchro results for the intersection level of service and the worst movement v/c ratio. The Synchro Analysis is included in this appendix.

**Table 1 – Improved Lane Utilization with Traditional Widening Synchro Analysis**

#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	B	0.78 NBL	B	0.83 NBL
2	I-71 SB ramps	C*	0.83 SBR/EBT	C*	0.94 SBR
3	Howe Road	C*	0.92 EBL	D*	0.96 EBL
4	SouthPark Center Drive	A	0.52 SBL	C	0.69 WBL
5	Falling Water Road	A	0.40 SBL	A	0.61 SBL
6	Placid Cove Drive	A	0.39 WBTR	C	0.79 WBT

\*LOS improved from No Build conditions

A capacity analysis was also performed using Highway Capacity Software 2010 to evaluate the benefits of improving the lane utilization along SR-82 eastbound and traditional widening at Howe Road using the existing volumes for the AM and PM peak periods. The HCS analysis was used to balance delay for the worst approach on one roadway with the worst approach on the other roadway. Table 2 summarizes the HCS results for intersection level of service and the worst movement v/c ratio. The HCS Analysis is included in this appendix.

The HCS analysis shows that if Howe Road is improved as stated above without any further improvements to the interchange, the westbound left movement at the SR-82 and I-71 SB ramps intersection will become 52% over capacity.

**Table 2 – Improved Lane Utilization with Traditional Widening HCS Analysis**

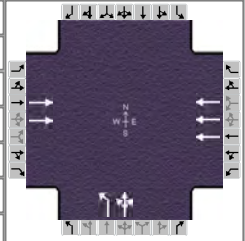
#	SR 82 Intersection with:	AM Peak		PM Peak	
		LOS	v/c ratio	LOS	v/c ratio
1	I-71 NB ramps	C	1.06 EBT	E*	1.14 EBT
2	I-71 SB ramps	D	1.37 WBL	E	1.52 WBL
3	Howe Road	D*	1.02 WBT	D†	1.22 WBL
4	SouthPark Center Drive	D†	1.07 WBR	D	1.07 WBTR
5	Falling Water Road	C†	1.02 WBR	C	1.07 WBTR
6	Placid Cove Drive	D	1.06 WBR	D	1.07 WBTR

\*LOS improved from No Build conditions

†LOS degraded from No Build conditions

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Parsons Brinckerhoff			Duration, h	0.25
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92
Intersection	I-71 NB Ramps	Analysis Year	2014	Analysis Period	1 > 7:00
File Name	2014 AM Peak_Traditional Widening.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		662			1362		266	0	116			

Signal Information				Signal Phases									
Cycle, s	140.0	Reference Phase	2	→	←	↔	↔	↔	↔	↔	↔	↔	↔
Offset, s	0	Reference Point	End	Green	81.8	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

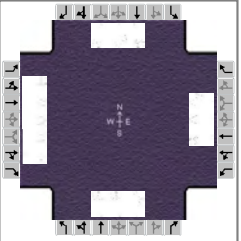
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4		
Case Number		8.0		8.0		10.0		
Phase Duration, s		88.4		88.4		51.6		
Change Period, (Y+R <sub>c</sub> ), s		6.6		6.6		6.6		
Max Allow Headway (MAH), s		0.0		0.0		4.2		
Queue Clearance Time (g <sub>s</sub> ), s						21.6		
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0		1.5		
Phase Call Probability						1.00		
Max Out Probability						0.00		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		6			2		7	4	14			
Adjusted Flow Rate (v), veh/h		2140			1480		289	289				
Adjusted Saturation Flow Rate (s), veh/h/ln		1723			1628		1691	1691				
Queue Service Time (g <sub>s</sub> ), s		81.8			25.3		19.6	19.6				
Cycle Queue Clearance Time (g <sub>c</sub> ), s		81.8			25.3		19.6	19.6				
Green Ratio (g/C)		0.58			0.58		0.32	0.32				
Capacity (c), veh/h		2013			2853		544	544				
Volume-to-Capacity Ratio (X)		1.063			0.519		0.532	0.532				
Available Capacity (c <sub>a</sub> ), veh/h		2013			2853		544	544				
Back of Queue (Q), veh/ln (95th percentile)		16.1			14.5		13.0	13.0				
Queue Storage Ratio (RQ) (95th percentile)		0.00			0.00		0.00	0.00				
Uniform Delay (d <sub>1</sub> ), s/veh		3.1			17.4		38.9	38.9				
Incremental Delay (d <sub>2</sub> ), s/veh		35.1			0.7		1.0	1.0				
Initial Queue Delay (d <sub>3</sub> ), s/veh		0.0			0.0		0.0	0.0				
Control Delay (d), s/veh		38.2			18.0		39.9	39.9				
Level of Service (LOS)		F			B		D	D				
Approach Delay, s/veh / LOS	38.2		D	18.0		B	38.5		D	0.0		
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	1.9	A	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.2	A		

# HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Parsons Brinckerhoff			Duration, h	0.25		
Analyst	JRL	Analysis Date	Jan 15, 2014	Area Type	Other		
Jurisdiction	ODOT District 12	Time Period	AM Peak	PHF	0.92		
Intersection	Placid Cove	Analysis Year	2014	Analysis Period	1 > 7:00		
File Name	2014 PM Peak_Traditional Widening.xus						
Project Description	PM Peak Original						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	5	1079	558	143	1428	3	400	1	149	88	11	46

Signal Information				Phase Diagrams											
Cycle, s	140.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	8.4	19.4	37.1	16.5	25.6	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	3.6	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	3.0	3.0	3.0	0.0					

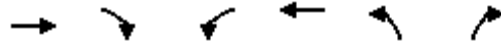
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	3.0	2.0	4.0		10.0		9.0
Phase Duration, s	15.0	43.7	41.0	69.7		32.2		23.1
Change Period, (Y+R <sub>c</sub> ), s	6.6	6.6	6.6	6.6		6.6		6.6
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g <sub>s</sub> ), s	2.3		13.8			18.3		8.9
Green Extension Time (g <sub>e</sub> ), s	0.0	0.0	0.5	0.0		1.6		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.01		0.00			0.34		0.07

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	5	1173	607	172	862	862	435	163		96	12	50
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1628	1594	1792	1792	1791	1740	1612		1810	1900	1594
Queue Service Time (g <sub>s</sub> ), s	0.3	32.5	37.1	11.8	63.1	63.1	16.3	12.9		6.9	0.8	3.7
Cycle Queue Clearance Time (g <sub>c</sub> ), s	0.3	32.5	37.1	11.8	63.1	63.1	16.3	12.9		6.9	0.8	3.7
Green Ratio (g/C)	0.32	0.26	0.45	0.25	0.45	0.45	0.18	0.18		0.12	0.12	0.18
Capacity (c), veh/h	160	1294	714	440	808	807	636	295		213	224	284
Volume-to-Capacity Ratio (X)	0.034	0.906	0.849	0.391	1.067	1.068	0.683	0.553		0.449	0.053	0.176
Available Capacity (c <sub>a</sub> ), veh/h	160	1294	714	440	808	807	636	295		213	224	284
Back of Queue (Q), veh/ln (95th percentile)	0.3	20.6	27.8	6.6	29.6	29.7	11.8	9.2		5.8	0.7	2.7
Queue Storage Ratio (RQ) (95th percentile)	0.05	0.00	1.25	0.46	0.00	0.00	0.00	0.00		0.00	0.00	0.57
Uniform Delay (d <sub>1</sub> ), s/veh	36.9	49.8	34.4	47.8	20.6	20.6	53.4	52.0		57.5	54.8	48.8
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	10.7	12.1	0.1	33.1	33.3	3.0	2.2		1.5	0.1	0.3
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	37.0	60.5	46.5	47.9	53.8	54.0	56.4	54.2		59.0	54.9	49.1
Level of Service (LOS)	D	E	D	D	F	F	E	D		E	D	D
Approach Delay, s/veh / LOS	55.7		E	53.3		D	55.8		E	55.6		E
Intersection Delay, s/veh / LOS	54.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.4	B	3.2	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.9	A	1.5	A	0.7	A

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

5/16/2014

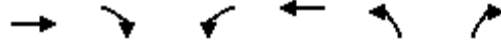


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	662	0	0	1362	266	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.959	
Flt Protected					0.965	
Satd. Flow (prot)	3438	0	0	4893	3188	0
Flt Permitted					0.965	
Satd. Flow (perm)	3438	0	0	4893	3188	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					45	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.67	0.78
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	720	0	0	1497	397	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	720	0	0	1497	546	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	86.0			86.0	54.0	
Total Split (%)	61.4%			61.4%	38.6%	
Maximum Green (s)	80.2			80.2	48.0	
Yellow Time (s)	3.6			3.6	3.0	

# Lanes, Volumes, Timings

## 1: I-71 NB Off Ramp

5/16/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	102.0			102.6	29.0	
Actuated g/C Ratio	0.73			0.73	0.21	
v/c Ratio	0.29			0.42	0.78	
Control Delay	4.4			8.0	56.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	4.4			8.0	56.2	
LOS	A			A	E	
Approach Delay	4.4			8.0	56.2	
Approach LOS	A			A	E	

### Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 75 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 16.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 45.4%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1717	230	107	739	0	0	0	318	0	908	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		0	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	*0.71	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Frt			0.850						0.850		0.850	
Flt Protected				0.950								
Satd. Flow (prot)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Flt Permitted				0.950								
Satd. Flow (perm)	0	3854	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			269									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		471			925		
Travel Time (s)		16.9			18.6		7.1			14.0		
Peak Hour Factor	0.92	0.85	0.77	0.76	0.77	0.92	0.92	0.92	0.89	0.92	0.82	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2020	299	141	960	0	0	0	357	0	1107	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		24			24		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	custom	Prot	NA				pt+ov		custom	
Protected Phases		6	7	5	2				4 5		1 4	1
Permitted Phases		6	6 7		2						1 4	
Detector Phase		6	7	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	4.0	10.0	25.0							1.0
Minimum Split (s)		32.0	10.6	17.0	32.0							20.0
Total Split (s)		95.0	20.0	25.0	78.0							42.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

5/16/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	20.0



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		67.9%	14.3%	17.9%	55.7%							30%
Maximum Green (s)		88.4	13.4	18.4	71.4							35.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead		Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	3.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		12.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effect Green (s)		88.4	108.4	18.4	72.4			39.0			54.4	
Actuated g/C Ratio		0.63	0.77	0.13	0.52			0.28			0.39	
v/c Ratio		0.83	0.24	0.63	0.38			0.48			0.83	
Control Delay		19.2	1.3	64.1	14.9			44.7			44.9	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay		19.2	1.3	64.1	14.9			44.7			44.9	
LOS		B	A	E	B			D			D	
Approach Delay		16.9			21.2							
Approach LOS		B			C							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 26.2  
 Intersection LOS: C  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	14%
Maximum Green (s)	14.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

# Lanes, Volumes, Timings

## 3: Howe Road & SR 82 Royalton Rd

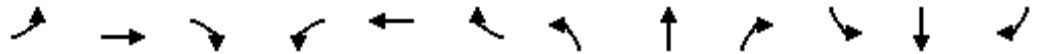
5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	1062	59	400	1227	48	116	32	846	39	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		800	570		250	300		0	110		0
Storage Lanes	2		1	2		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	*0.75	0.86	0.97	0.91	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.982				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (prot)	3467	5337	0	3433	4940	1583	1665	1742	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.982		0.950		
Satd. Flow (perm)	3467	5337	0	3433	4940	1583	1665	1742	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		27				79						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			665				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.78	0.87	0.36	0.81	0.86	0.80	0.85	0.50	0.92	0.81	0.38	0.46
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	36	1221	164	494	1427	60	136	64	920	48	8	24
Shared Lane Traffic (%)							28%					
Lane Group Flow (vph)	36	1385	0	494	1427	60	98	102	920	48	8	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	8 1	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	8 1	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	13.0	70.0		26.0	83.0	20.0	24.0	24.0		20.0	20.0	13.0

Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

5/16/2014

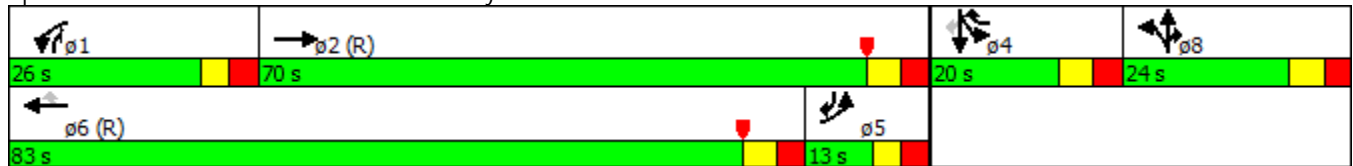


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.3%	50.0%		18.6%	59.3%	14.3%	17.1%	17.1%		14.3%	14.3%	9.3%
Maximum Green (s)	7.0	63.4		20.0	76.4	13.4	17.4	17.4		13.4	13.4	7.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effct Green (s)	9.0	65.4		22.0	81.0	93.9	25.7	25.7	51.7	11.6	11.6	21.9
Actuated g/C Ratio	0.06	0.47		0.16	0.58	0.67	0.18	0.18	0.37	0.08	0.08	0.16
v/c Ratio	0.16	0.55		0.92	0.50	0.06	0.32	0.32	0.89	0.17	0.05	0.07
Control Delay	66.4	29.4		80.9	8.8	0.2	55.0	54.8	53.6	61.3	60.0	0.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.4	29.4		80.9	8.8	0.2	55.0	54.8	53.6	61.3	60.0	0.4
LOS	E	C		F	A	A	D	D	D	E	E	A
Approach Delay		30.4			26.5			53.8			42.9	
Approach LOS		C			C			D			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 34.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 72.6%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 \* User Entered Value

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	1050	39	41	1166	60	4	1	11	59	3	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00
Frt		0.994			0.988			0.910	0.850			0.900
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4874	0	3467	4853	0	3467	1626	1519	1787	1693	0
Flt Permitted	0.133			0.950			0.950			0.950		
Satd. Flow (perm)	248	4874	0	3467	4853	0	3467	1626	1519	1787	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			14			6	122			16
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.75	0.95	0.81	0.79	0.81	0.47	0.50	0.25	0.69	0.70	0.38	0.63
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	28	1105	48	52	1440	128	8	4	16	84	8	16
Shared Lane Traffic (%)									39%			
Lane Group Flow (vph)	28	1153	0	52	1568	0	8	10	10	84	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	73.0		12.0	73.0		12.0	36.0	12.0	19.0		43.0

Lanes, Volumes, Timings  
 4: Southpark Mall East Drive & SR 82 Royalton Rd

5/16/2014

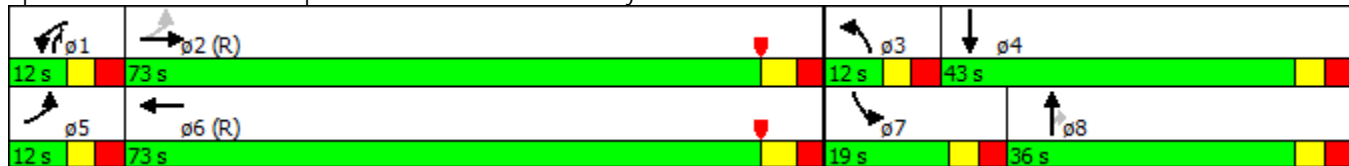


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	52.1%		8.6%	52.1%		8.6%	25.7%	8.6%	13.6%	30.7%	
Maximum Green (s)	6.0	66.4		6.0	66.4		6.0	30.0	6.0	13.0	37.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	111.1	104.1		9.2	107.6		7.8	11.8	12.4	12.6	13.4	
Actuated g/C Ratio	0.79	0.74		0.07	0.77		0.06	0.08	0.09	0.09	0.10	
v/c Ratio	0.10	0.32		0.23	0.42		0.04	0.07	0.04	0.52	0.14	
Control Delay	3.8	5.2		82.7	2.9		63.2	40.8	0.3	72.3	31.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	3.8	5.2		82.7	2.9		63.2	40.8	0.3	72.3	31.5	
LOS	A	A		F	A		E	D	A	E	C	
Approach Delay		5.2			5.4			32.7			63.2	
Approach LOS		A			A			C			E	

Intersection Summary

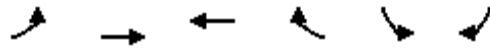
Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 34 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.52  
 Intersection Signal Delay: 7.7  
 Intersection LOS: A  
 Intersection Capacity Utilization 50.2%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

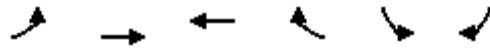
5/16/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↑↑↔		↘	↙
Volume (vph)	54	1028	1082	67	47	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	4860	0	1593	1398
Flt Permitted	0.152				0.950	
Satd. Flow (perm)	286	4893	4860	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			13			56
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.61	0.92	0.80	0.80	0.84	0.71
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	89	1117	1352	84	56	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	1117	1436	0	56	56
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

5/16/2014

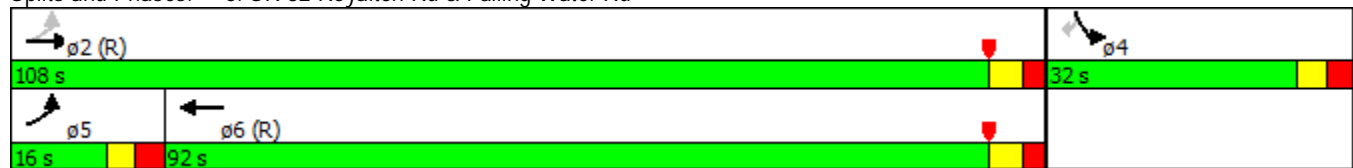


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	16.0	108.0	92.0		32.0	32.0
Total Split (%)	11.4%	77.1%	65.7%		22.9%	22.9%
Maximum Green (s)	10.0	101.9	85.9		26.0	26.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	121.2	122.1	108.1		12.4	12.4
Actuated g/C Ratio	0.87	0.87	0.77		0.09	0.09
v/c Ratio	0.26	0.26	0.38		0.40	0.32
Control Delay	4.0	1.3	0.6		68.5	19.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	4.0	1.3	0.7		68.5	19.1
LOS	A	A	A		E	B
Approach Delay		1.5	0.7		43.8	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 46 (33%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.40  
 Intersection Signal Delay: 2.8  
 Intersection LOS: A  
 Intersection Capacity Utilization 48.5%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd





# Lanes, Volumes, Timings

## 6: West Mall /Placid Cove & SR 82 Royalton Rd

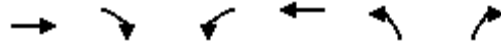
5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1040	106	51	1016	133	31	8	17	5	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		0	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850		0.983			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1805	4893	1599	1787	4836	0	3467	1707	0	1715	1600	1652
Flt Permitted	0.160			0.222			0.950			0.950	0.950	
Satd. Flow (perm)	304	4893	1599	418	4836	0	3467	1707	0	1715	1600	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143		24			36				75
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.75	0.93	0.74	0.75	0.82	0.85	0.78	0.40	0.47	0.42	0.92	0.38
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	56	1118	143	68	1239	156	40	20	36	12	0	16
Shared Lane Traffic (%)										50%		
Lane Group Flow (vph)	56	1118	143	68	1395	0	40	56	0	6	6	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100		20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6								4
Detector Phase	5	2	8	1	6		8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0		10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6		33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings  
1: I-71 NB Off Ramp

5/16/2014

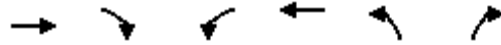


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑↑	
Volume (vph)	1665	0	0	1260	327	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	0.95
Frt					0.947	
Flt Protected					0.969	
Satd. Flow (prot)	3438	0	0	4893	3161	0
Flt Permitted					0.969	
Satd. Flow (perm)	3438	0	0	4893	3161	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					30	
Link Speed (mph)	30			30	45	
Link Distance (ft)	266			480	531	
Travel Time (s)	6.0			10.9	8.0	
Peak Hour Factor	0.92	0.92	0.92	0.93	0.86	0.82
Heavy Vehicles (%)	5%	2%	2%	6%	7%	7%
Adj. Flow (vph)	1810	0	0	1355	380	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1810	0	0	1355	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	1			1	1	
Detector Template	Thru			Thru	Left	
Leading Detector (ft)	100			100	20	
Trailing Detector (ft)	0			0	0	
Detector 1 Position(ft)	0			0	0	
Detector 1 Size(ft)	100			100	20	
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0			0.0	0.0	
Turn Type	NA			NA	Prot	
Protected Phases	2			6	8	
Permitted Phases						
Detector Phase	2			6	8	
Switch Phase						
Minimum Initial (s)	32.0			32.0	10.0	
Minimum Split (s)	53.0			38.0	20.0	
Total Split (s)	100.0			100.0	40.0	
Total Split (%)	71.4%			71.4%	28.6%	
Maximum Green (s)	94.2			94.2	34.0	
Yellow Time (s)	3.6			3.6	3.0	

# Lanes, Volumes, Timings

## 1: I-71 NB Off Ramp

5/16/2014

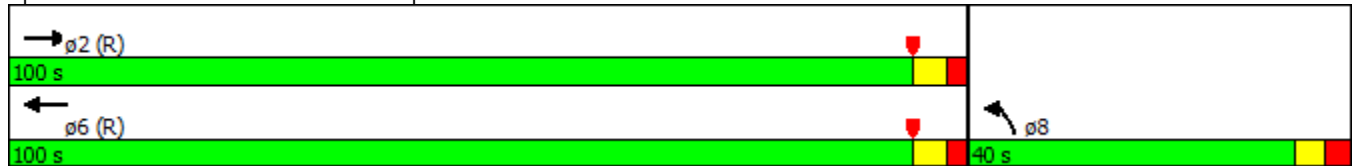


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.2			2.2	3.0	
Lost Time Adjust (s)	-1.4			-2.0	-1.4	
Total Lost Time (s)	4.4			3.8	4.6	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			2.0	2.5	
Recall Mode	C-Max			C-Max	None	
Walk Time (s)	8.0					
Flash Dont Walk (s)	13.0					
Pedestrian Calls (#/hr)	0					
Act Effect Green (s)	100.5			101.1	30.5	
Actuated g/C Ratio	0.72			0.72	0.22	
v/c Ratio	0.73			0.38	0.83	
Control Delay	11.2			8.2	59.6	
Queue Delay	0.0			0.0	0.0	
Total Delay	11.2			8.2	59.6	
LOS	B			A	E	
Approach Delay	11.2			8.2	59.6	
Approach LOS	B			A	E	

### Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 108 (77%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 17.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 68.2%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: I-71 NB Off Ramp



Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Lane Configurations		↑↑↑	↑	↑	↑↑↑				↑↑		↑↑↑	
Volume (vph)	0	1850	381	85	1188	0	0	0	701	0	1779	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		530	256		0	0	450		0	800	
Storage Lanes	0		0	1		0	0	1		0	2	
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	0.88	1.00	0.76	
Frt			0.850						0.850		0.850	
Flt Protected				0.950								
Satd. Flow (prot)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Flt Permitted				0.950								
Satd. Flow (perm)	0	4940	1538	1703	4893	0	0	0	2656	0	3441	
Right Turn on Red			Yes			Yes			No		No	
Satd. Flow (RTOR)			350									
Link Speed (mph)		35			35		45			45		
Link Distance (ft)		867			953		669			1107		
Travel Time (s)		16.9			18.6		10.1			16.8		
Peak Hour Factor	0.92	0.87	0.87	0.46	0.86	0.92	0.92	0.92	0.90	0.92	0.96	
Heavy Vehicles (%)	2%	5%	5%	6%	6%	2%	2%	2%	7%	2%	7%	
Adj. Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2126	438	185	1381	0	0	0	779	0	1853	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Left	Left	Right	
Median Width(ft)		24			24		0			0		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15	9	9	15	15	
Number of Detectors		1	1	1	1				1		1	
Detector Template		Thru	Right	Left	Thru				Right		Right	
Leading Detector (ft)		100	20	20	100				20		20	
Trailing Detector (ft)		0	0	0	0				0		0	
Detector 1 Position(ft)		0	0	0	0				0		0	
Detector 1 Size(ft)		100	20	20	100				20		20	
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Queue (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Detector 1 Delay (s)		0.0	0.0	0.0	0.0				0.0		0.0	
Turn Type		NA	Perm	Prot	NA				pt+ov		custom	
Protected Phases		6		5	2				4 5		1 4	1
Permitted Phases		6	6		2						1 4	
Detector Phase		6	6	5	2				4 5		1 4	
Switch Phase												
Minimum Initial (s)		25.0	25.0	10.0	25.0							1.0
Minimum Split (s)		32.0	32.0	17.0	32.0							20.0
Total Split (s)		83.0	83.0	28.0	53.0							58.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

5/16/2014

Lane Group	ø4
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	20.0
Total Split (s)	29.0

Lanes, Volumes, Timings  
 2: I-71 SB Ramp & SR 82 Royalton Rd

5/16/2014

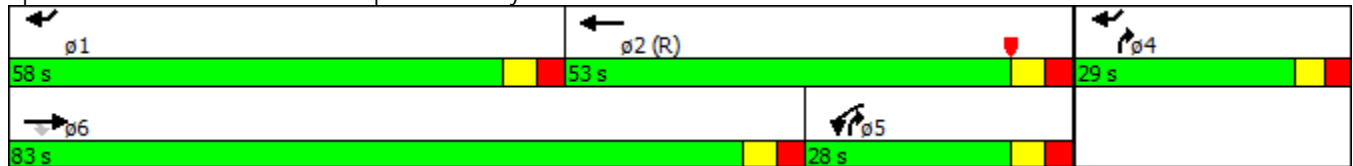


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	NBR2	SWL	SWR	ø1
Total Split (%)		59.3%	59.3%	20.0%	37.9%							41%
Maximum Green (s)		76.4	76.4	21.4	46.4							51.4
Yellow Time (s)		3.6	3.6	3.6	3.6							3.6
All-Red Time (s)		3.0	3.0	3.0	3.0							3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0							
Total Lost Time (s)		6.6	6.6	6.6	6.6							
Lead/Lag		Lead	Lead	Lag	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0	5.0	3.0	5.0							4.0
Recall Mode		None	None	None	C-Max							None
Walk Time (s)		7.0	7.0		7.0							
Flash Dont Walk (s)		12.0	12.0		10.0							
Pedestrian Calls (#/hr)		0	0		0							
Act Effct Green (s)		76.4	76.4	21.4	46.4			51.0			80.4	
Actuated g/C Ratio		0.55	0.55	0.15	0.33			0.36			0.57	
v/c Ratio		0.79	0.44	0.71	0.85			0.81			0.94	
Control Delay		15.5	2.2	61.4	39.6			47.7			38.0	
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay		15.5	2.2	61.4	39.6			47.7			38.0	
LOS		B	A	E	D			D			D	
Approach Delay		13.3			42.2							
Approach LOS		B			D							

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 60 (43%), Referenced to phase 2:WBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 30.7  
 Intersection LOS: C  
 Intersection Capacity Utilization Err%  
 ICU Level of Service H  
 Analysis Period (min) 15

Splits and Phases: 2: I-71 SB Ramp & SR 82 Royalton Rd



Lane Group	ø4
Total Split (%)	21%
Maximum Green (s)	23.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	4.0
Recall Mode	Max
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	

Lanes, Volumes, Timings  
3: Howe Road & SR 82 Royaltan Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	1412	77	867	1779	321	170	102	597	222	140	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		800	570		250	300		0	110		0
Storage Lanes	2		1	2		1	2		2	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	0.95	0.95	0.88	0.97	1.00	1.00
Frt		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (prot)	3467	6155	0	3433	4940	1583	1665	1757	2814	3433	1881	1599
Flt Permitted	0.950			0.950			0.950	0.988		0.950		
Satd. Flow (perm)	3467	6155	0	3433	4940	1583	1665	1757	2814	3433	1881	1599
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		14				178						126
Link Speed (mph)		35			35			35				35
Link Distance (ft)		960			867			667				384
Travel Time (s)		18.7			16.9			13.0				7.5
Peak Hour Factor	0.88	0.82	0.53	0.80	0.95	0.69	0.92	0.88	0.90	0.80	0.83	0.69
Heavy Vehicles (%)	1%	5%	4%	2%	5%	2%	3%	1%	1%	2%	1%	1%
Adj. Flow (vph)	217	1722	145	1084	1873	465	185	116	663	278	169	351
Shared Lane Traffic (%)							20%					
Lane Group Flow (vph)	217	1867	0	1084	1873	465	148	153	663	278	169	351
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	100		20	100	20	20	100	20	20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	pt+ov	Split	NA	pm+ov
Protected Phases	5	2		1	6	4	8	8	8 1	4	4	5
Permitted Phases						6						4
Detector Phase	5	2		1	6	4	8	8	8 1	4	4	5
Switch Phase												
Minimum Initial (s)	7.0	27.0		10.0	27.0	10.0	10.0	10.0		10.0	10.0	7.0
Minimum Split (s)	13.0	40.6		16.0	46.6	41.6	20.0	20.0		41.6	41.6	13.0
Total Split (s)	14.0	50.0		50.0	86.0	20.0	20.0	20.0		20.0	20.0	14.0



Lanes, Volumes, Timings  
 3: Howe Road & SR 82 Royalton Rd

5/16/2014

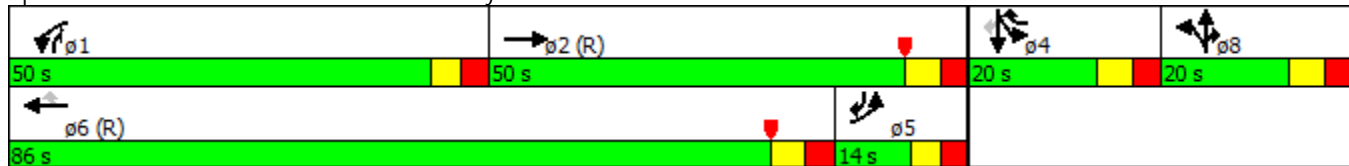


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	10.0%	35.7%		35.7%	61.4%	14.3%	14.3%	14.3%		14.3%	14.3%	10.0%
Maximum Green (s)	8.0	43.4		44.0	79.4	13.4	13.4	13.4		13.4	13.4	8.0
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.6	3.6		3.6	3.6	3.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0	-1.6	-1.6		-1.6	-1.6	-1.6
Total Lost Time (s)	4.0	4.6		4.0	4.6	4.6	5.0	5.0		5.0	5.0	4.4
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max	None	None	None		None	None	None
Walk Time (s)		9.0			10.0	9.0				9.0	9.0	
Flash Dont Walk (s)		25.0			30.0	26.0				26.0	26.0	
Pedestrian Calls (#/hr)		0			0	0				0	0	
Act Effect Green (s)	10.0	45.4		46.0	81.4	96.8	15.0	15.0	65.0	15.0	15.0	29.6
Actuated g/C Ratio	0.07	0.32		0.33	0.58	0.69	0.11	0.11	0.46	0.11	0.11	0.21
v/c Ratio	0.88	0.93		0.96	0.65	0.40	0.83	0.81	0.51	0.76	0.84	0.80
Control Delay	80.8	40.0		58.6	19.8	4.9	95.6	91.9	28.0	74.6	93.8	48.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.8	40.0		58.6	19.8	4.9	95.6	91.9	28.0	74.6	93.8	48.1
LOS	F	D		E	B	A	F	F	C	E	F	D
Approach Delay		44.2			30.1			48.5			67.0	
Approach LOS		D			C			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 40.6  
 Intersection LOS: D  
 Intersection Capacity Utilization 79.4%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 3: Howe Road & SR 82 Royalton Rd



# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	1227	52	328	1414	58	95	7	257	102	18	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	580		0	185		185	0		0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	0.97	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00
Fr't		0.993			0.992			0.859	0.850			0.916
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4869	0	3467	4867	0	3467	1535	1519	1787	1723	0
Flt Permitted	0.135			0.950			0.950			0.950		
Satd. Flow (perm)	251	4869	0	3467	4867	0	3467	1535	1519	1787	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			8			148	122			36
Link Speed (mph)		35			35			25				25
Link Distance (ft)		564			960			408				362
Travel Time (s)		11.0			18.7			11.1				9.9
Peak Hour Factor	0.60	0.85	0.76	0.90	0.95	0.69	0.77	0.77	0.85	0.77	0.64	0.86
Heavy Vehicles (%)	2%	6%	1%	1%	6%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	60	1444	68	364	1488	84	123	9	302	132	28	36
Shared Lane Traffic (%)									49%			
Lane Group Flow (vph)	60	1512	0	364	1572	0	123	157	154	132	64	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1		1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (ft)	20	100		20	100		20	100	20	20		100
Trailing Detector (ft)	0	0		0	0		0	0	0	0		0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0		0
Detector 1 Size(ft)	20	100		20	100		20	100	20	20		100
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Turn Type	pm+pt	NA		Prot	NA		Prot	NA	pm+ov	Prot		NA
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2								8			
Detector Phase	5	2		1	6		3	8	1	7		4
Switch Phase												
Minimum Initial (s)	6.0	35.0		6.0	35.0		6.0	10.0	6.0	6.0		6.0
Minimum Split (s)	12.0	48.6		12.0	41.6		12.0	36.0	12.0	12.0		39.0
Total Split (s)	12.0	58.0		24.0	70.0		13.0	36.0	24.0	22.0		45.0

# Lanes, Volumes, Timings

## 4: Southpark Mall East Drive & SR 82 Royalton Rd

5/16/2014

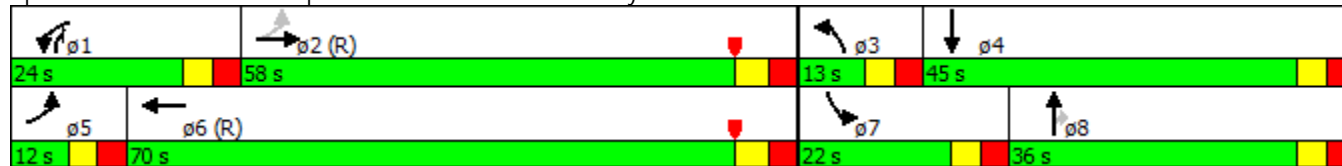


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	8.6%	41.4%		17.1%	50.0%		9.3%	25.7%	17.1%	15.7%	32.1%	
Maximum Green (s)	6.0	51.4		18.0	63.4		7.0	30.0	18.0	16.0	39.0	
Yellow Time (s)	3.0	3.6		3.0	3.6		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.8	-1.8	-2.0	-1.3	-1.3	
Total Lost Time (s)	4.0	4.6		4.0	4.6		4.2	4.2	4.0	4.7	4.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0		2.5	2.0		3.5	2.5	2.5	3.5	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Walk Time (s)		8.0			7.0			7.0			9.0	
Flash Dont Walk (s)		34.0			24.0			23.0			24.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	82.1	72.9		21.3	87.9		12.7	12.6	38.1	15.7	18.0	
Actuated g/C Ratio	0.59	0.52		0.15	0.63		0.09	0.09	0.27	0.11	0.13	
v/c Ratio	0.25	0.60		0.69	0.51		0.39	0.58	0.31	0.66	0.25	
Control Delay	9.5	17.0		76.9	7.0		66.4	19.3	11.4	75.5	28.7	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	9.5	17.2		76.9	7.0		66.4	19.3	11.4	75.5	28.7	
LOS	A	B		E	A		E	B	B	E	C	
Approach Delay		16.9			20.1			29.8			60.2	
Approach LOS		B			C			C			E	

### Intersection Summary

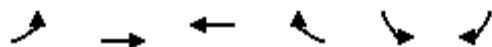
Area Type:	Other
Cycle Length:	140
Actuated Cycle Length:	140
Offset:	19 (14%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle:	115
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.69
Intersection Signal Delay:	21.8
Intersection LOS:	C
Intersection Capacity Utilization	61.9%
ICU Level of Service	B
Analysis Period (min)	15

### Splits and Phases: 4: Southpark Mall East Drive & SR 82 Royalton Rd



Lanes, Volumes, Timings  
5: SR 82 Royalton Rd & Falling Water Rd

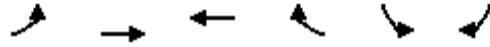
5/16/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑↑	↑↑↑		↘	↘
Volume (vph)	89	1172	1445	112	99	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	9	9
Storage Length (ft)	130			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.91	0.91	0.91	1.00	1.00
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	4893	4850	0	1593	1398
Flt Permitted	0.104				0.950	
Satd. Flow (perm)	196	4893	4850	0	1593	1398
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			17			163
Link Speed (mph)		35	35		25	
Link Distance (ft)		654	564		403	
Travel Time (s)		12.7	11.0		11.0	
Peak Hour Factor	0.86	0.88	0.92	0.80	0.88	0.76
Heavy Vehicles (%)	1%	6%	6%	2%	2%	4%
Adj. Flow (vph)	103	1332	1571	140	112	163
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	1332	1711	0	112	163
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		9	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.14
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	100	100		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0		10.0	10.0
Minimum Split (s)	13.0	34.1	34.1		30.0	30.0

Lanes, Volumes, Timings  
 5: SR 82 Royalton Rd & Falling Water Rd

5/16/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (s)	20.0	104.0	84.0		36.0	36.0
Total Split (%)	14.3%	74.3%	60.0%		25.7%	25.7%
Maximum Green (s)	14.0	97.9	77.9		30.0	30.0
Yellow Time (s)	3.0	3.6	3.6		3.0	3.0
All-Red Time (s)	3.0	2.5	2.5		3.0	3.0
Lost Time Adjust (s)	-1.4	-1.4	-1.4		-1.0	-1.0
Total Lost Time (s)	4.6	4.7	4.7		5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5	2.0	2.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		6.0	6.0
Flash Dont Walk (s)		21.0	21.0		17.0	17.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	114.1	114.0	100.4		16.3	16.3
Actuated g/C Ratio	0.82	0.81	0.72		0.12	0.12
v/c Ratio	0.39	0.33	0.49		0.61	0.53
Control Delay	15.7	0.7	4.5		71.7	14.1
Queue Delay	0.0	0.0	0.1		0.0	0.0
Total Delay	15.7	0.7	4.6		71.7	14.1
LOS	B	A	A		E	B
Approach Delay		1.7	4.6		37.6	
Approach LOS		A	A		D	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 52 (37%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 6.1  
 Intersection LOS: A  
 Intersection Capacity Utilization 56.5%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 5: SR 82 Royalton Rd & Falling Water Rd



# Lanes, Volumes, Timings

## 6: West Mall /Placid Cove & SR 82 Royalton Rd

5/16/2014

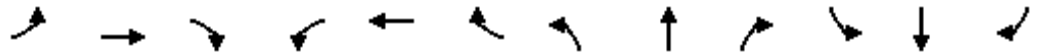


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑	↗	↘↗	↗		↘	↗	↗
Volume (vph)	5	1079	558	143	1428	3	400	1	149	88	11	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	10	13
Storage Length (ft)	175		560	365		0	0		0	0		120
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	0.97	1.00	1.00	0.95	0.95	1.00
Frt			0.850			0.850		0.854				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.963	
Satd. Flow (prot)	1805	4893	1599	1787	3406	1599	3467	1607	0	1715	1622	1652
Flt Permitted	0.075			0.121			0.950			0.950	0.963	
Satd. Flow (perm)	142	4893	1599	228	3406	1599	3467	1607	0	1715	1622	1652
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			581			117		109				122
Link Speed (mph)		35			35			25				25
Link Distance (ft)		930			654			362				400
Travel Time (s)		18.1			12.7			9.9				10.9
Peak Hour Factor	0.63	0.78	0.96	0.83	0.93	0.38	0.95	0.25	0.93	0.55	0.55	0.64
Heavy Vehicles (%)	0%	6%	1%	1%	6%	1%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	8	1383	581	172	1535	8	421	4	160	160	20	72
Shared Lane Traffic (%)										44%		
Lane Group Flow (vph)	8	1383	581	172	1535	8	421	164	0	90	90	72
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	0.96
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1	1	1	1		1	1	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	100	20	20	100	20	20	100		20	100	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2	8	1	6		8	8		4	4	5
Permitted Phases	2		2	6		6						4
Detector Phase	5	2	8	1	6	6	8	8		4	4	5
Switch Phase												
Minimum Initial (s)	5.0	30.0	10.0	6.0	30.0	30.0	10.0	10.0		10.0	10.0	5.0
Minimum Split (s)	11.0	39.6	33.0	12.0	45.6	45.6	33.0	33.0		16.0	16.0	11.0

Lanes, Volumes, Timings

6: West Mall /Placid Cove & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	73.0	33.0	18.0	80.0	80.0	33.0	33.0		16.0	16.0	11.0
Total Split (%)	7.9%	52.1%	23.6%	12.9%	57.1%	57.1%	23.6%	23.6%		11.4%	11.4%	7.9%
Maximum Green (s)	5.0	66.4	27.0	12.0	73.4	73.4	27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6	3.6	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	0.0	-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6	6.6	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0	3.0	3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0	32.0	20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0	0	0	0				
Act Effct Green (s)	79.6	72.0	99.8	88.8	79.4	77.4	27.2	27.2		12.0	12.0	19.0
Actuated g/C Ratio	0.57	0.51	0.71	0.63	0.57	0.55	0.19	0.19		0.09	0.09	0.14
v/c Ratio	0.05	0.55	0.44	0.61	0.79	0.01	0.63	0.41		0.61	0.65	0.22
Control Delay	14.2	24.8	2.0	41.2	20.5	0.0	56.0	20.6		80.0	83.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	14.2	24.8	2.0	41.2	20.5	0.0	56.0	20.6		80.0	83.5	1.9
LOS	B	C	A	D	C	A	E	C		E	F	A
Approach Delay		18.0			22.5			46.0			58.9	
Approach LOS		B			C			D			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 13 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 25.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 77.2%  
 ICU Level of Service D  
 Analysis Period (min) 15

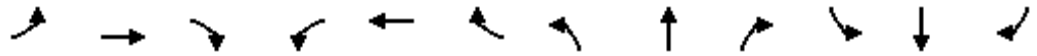
Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd



Lanes, Volumes, Timings

6: West Mall /Placid Cove & SR 82 Royalton Rd

5/16/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	79.0	33.0	12.0	80.0		33.0	33.0		16.0	16.0	11.0
Total Split (%)	7.9%	56.4%	23.6%	8.6%	57.1%		23.6%	23.6%		11.4%	11.4%	7.9%
Maximum Green (s)	5.0	72.4	27.0	6.0	73.4		27.0	27.0		10.0	10.0	5.0
Yellow Time (s)	3.0	3.6	3.0	3.0	3.6		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.6	4.0	4.0	4.6		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	3.0	3.0	2.5	3.0		3.0	3.0		4.5	4.5	2.5
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0		7.0	7.0				
Flash Dont Walk (s)		26.0	20.0		32.0		20.0	20.0				
Pedestrian Calls (#/hr)		0	0		0		0	0				
Act Effct Green (s)	109.8	102.7	118.7	110.6	103.0		12.2	12.2		12.0	12.0	12.7
Actuated g/C Ratio	0.78	0.73	0.85	0.79	0.74		0.09	0.09		0.09	0.09	0.09
v/c Ratio	0.17	0.31	0.10	0.16	0.39		0.13	0.31		0.04	0.04	0.07
Control Delay	6.8	9.4	1.2	1.9	2.0		60.0	31.9		59.7	59.7	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	6.8	9.4	1.2	1.9	2.0		60.0	31.9		59.7	59.7	0.7
LOS	A	A	A	A	A		E	C		E	E	A
Approach Delay		8.4			2.0			43.6			26.0	
Approach LOS		A			A			D			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 40 (29%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.39  
 Intersection Signal Delay: 6.5  
 Intersection LOS: A  
 Intersection Capacity Utilization 48.8%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 6: West Mall /Placid Cove & SR 82 Royalton Rd

